MAR 10 '32

MARCH
1932

FLEET OWNER

THE FERGUSON PUBLISHING CO., 90 WEST ST., NEW YORK, N.Y.

Devoted to the Better Operation and Maintenance of Truck, Bus, Taxicab, Passenger Car and All Automotive Fleets

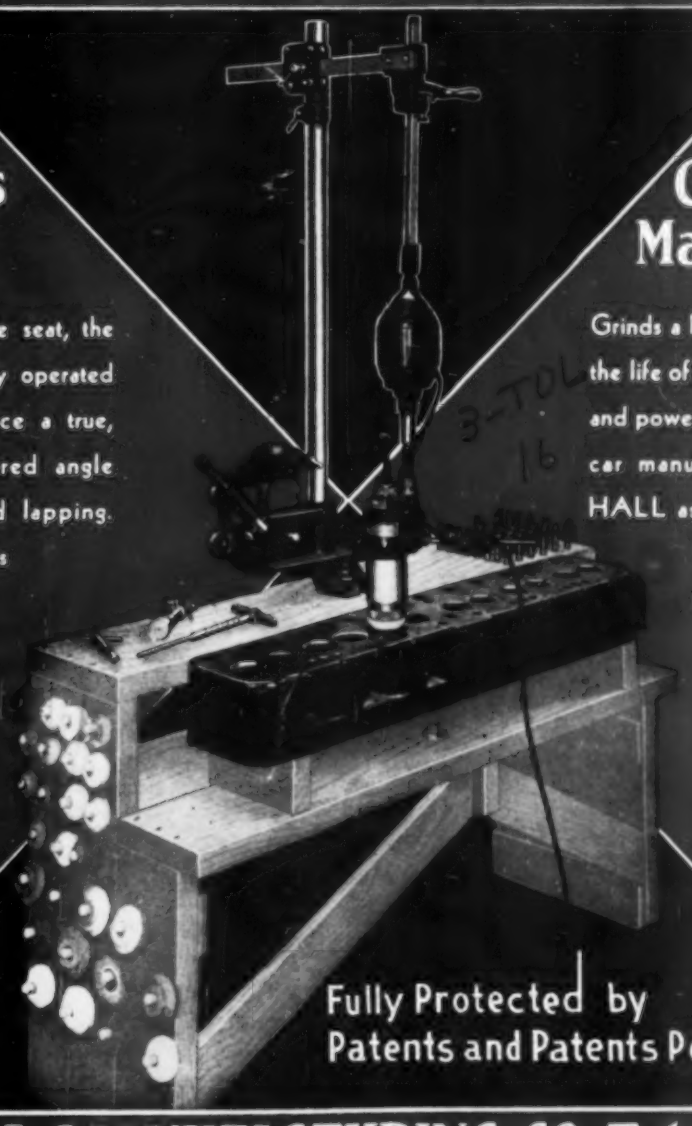
ECCENTRIC HALL PRINCIPLE

Valve Seat Grinder

Grinds Hardened Valve Seats Perfectly

Regardless of how hard the seat, the HALL with its eccentrically operated grinding wheel will produce a true, perfect seat of any desired angle quickly and without hand lapping. Will also grind cast iron seats as well.

A Perfect Seat at Any Angle Without Hand Lapping



Approved by Leading Car and Truck Manufacturers

Grinds a hardened seat so perfectly that the life of valves is materially lengthened and power increased. Leading truck and car manufacturers are adopting the HALL as standard with their Service Stations and recommend it to their fleet customers.

Write Today for Complete Information

Fully Protected by Patents and Patents Pending

The HALL MANUFACTURING CO. Toledo, Ohio

INTERNATIONAL HARVESTER

Announces a

new 6-*cylinder* truck

1½ TON
Two wheelbase lengths, 136 and 160 inches

International Harvester takes particular pride in announcing this new truck. Even to an organization which has made quality trucks for nearly thirty years, the Model A-3 is an outstanding example of both design and construction.

The Harvester organization presents the Model A-3 as reflecting the century-old reputation for quality that is behind all International products. It offers this lasting quality in a truck of smooth 6-cylinder power at the remarkably low chassis price of $795.

Look at this new truck . . . and do not hesitate to judge its value by what you see. For International appearance is an accurate indication of International performance . . . and the A-3 is no exception to this rule.

Here is a truck of great stamina . . . a fast truck . . . a powerful and dependable truck. It is beautiful both inside and out. And judged on whatever basis of cost-figuring you may use, you will find it decidedly economical.

$795
for the 136-inch wheelbase chassis, standard equipment, f.o.b. factory

Model A-3 Features

4-speeds forward and 1 reverse ... powerful 6-cylinder, L-Head type engine, 3¼-inch bore x 4½-inch stroke ... 11-inch single plate, vibration-dampened clutch ... irreversible cam-and-lever steering gear ... semi-elliptic auxiliary rear springs ... 4-wheel, mechanical internal-expanding shoe type brakes ... 2 wheelbases, 136 and 160-inch.

INTERNATIONAL

Go to a dealer's showroom, or to one of the 183 Company-owned branches in the United States and Canada. See the new Model A-3. Then test it in your own way on your own job. Then *own* it.

And remember that when you do own it, you can rely upon the famous Harvester Company service organization to make sure the Model A-3 will deliver the famous International service to you!

INTERNATIONAL HARVESTER COMPANY OF AMERICA (INCORPORATED)
606 S. Michigan Ave. Chicago, Ill.

INTERNATIONAL TRUCKS

PERFORMANCE
Extra Values Count

"Firestone Tires practically eliminated our tire worries . . . reduced our road delays . . . increased our mileage", writes Robert King, Treasurer of King Bros. Transportation Co., Lebanon, Ohio.

King Bros. need safe, dependable tires because their 24 buses travel more than 1,150,000 miles each year. They chose Firestone because the Firestone Extra Values—Gum-Dipping and Two Extra Cord Plies Under the Tread, and Safe, Long-Wearing Non-Skid Tread provide the extra safety they need.

You, too, can increase the operating efficiency of your fleet by equipping with Firestone Tires. Go to your local Firestone Dealer. He can show you how Firestone Tires and Service *will save you money*.

Listen to the **"VOICE OF FIRESTONE"** *Every Monday Night Over N.B.C. Nationwide Network*

Firestone
BUS BALLOONS

TIRES · TUBES · BATTERIES · BRAKE LINING · SPARK PLUGS · RIMS · ACCESSORIES

Say "I saw it in FLEET OWNER"—It Helps!

New and HIGHER STANDARD for ETHYL GASOLINE

Use Ethyl for Safety and more Efficient Operation

The pounding of a knocking engine is as bad on the driver's nerves as it is on the engine. He isn't likely to take much care of a truck that he feels is ready for the scrap pile anyhow. Ethyl stops knocking!

The increasing use of Ethyl Gasoline by truck operators is definitely a step toward safer, more efficient operation. Because Ethyl pulls better, it doesn't necessitate shifting into slower low gears and there is less temptation to "whoop it up" when a hill is in sight.

Routes can be covered in less time without exceeding safe speed limits. Drivers find the Ethyl fueled truck less fatiguing because of reduced shifting and strain. Truck owners find better results from the standpoint of increased efficiency, both from their drivers and their equipment.

Say "I saw it in FLEET OWNER"—It Helps!

New and HIGHER STANDARD for ETHYL GASOLINE

Announced this month

TRUCK OPERATORS BENEFIT BY OIL COMPANIES' ADVANCE

PRACTICALLY overnight every truck operator who uses Ethyl Gasoline is finding himself with better equipment! Without so much as turning a set-screw he is now securing better performance from his trucks. Better performance because he is getting better gasoline. The anti-knock standard of Ethyl Gasoline is now being raised.

Why the change?

Ethyl was created to fill the need of the automotive industry for a fuel that would allow more efficient engines of higher compression ratio. In the years Ethyl has been on the market every manufacturer has increased the compression of his engines. Nearly every passenger car manufacturer and several leading manufacturers of heavy duty engines now offer high compression as either standard or optional equipment. Some super-high compression engines are now being sold.

The oil companies selling Ethyl Gasoline have always met the demands of automobile engines. They intend to keep abreast of future needs. The anti-knock standard of Ethyl Gasoline is raised to make sure that —in the future as in the past— Ethyl will always bring out the *full* performance of *any* engine.

The new Ethyl Gasoline meets the requirements of the new high compression engines . . . safely, easily. Super-compression, minor carbon deposits, hard-pulling, heat . . . won't make it knock.

In older trucks, too, there is more reason now than ever before to use Ethyl Gasoline. It assures smooth, extra powerful operation. It offers a greater improvement in performance —a greater value for your money than ever before.

Put away your test apparatus

You need never test Ethyl Gasoline! Before a refiner mixes Ethyl fluid with his gasoline he sends a sample of it to the Ethyl laboratories. Here it is tested first to see if it is a good motor fuel from the standpoint of gum, sulphur, and distillation. If it passes these tests the amount of Ethyl fluid which must be added to bring it up to the Ethyl standard of anti-knock value is determined. The refiner adds this prescribed amount and submits a sample of the finished Ethyl Gasoline for final approval before it can be shipped. This is done for each individual mix of gasoline!

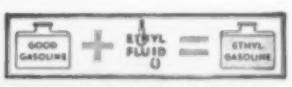
Today the requirements for Ethyl Gasoline are higher than ever before.

Now is the time to consider Ethyl in your fleet!

You can duplicate the experience of other truck and bus operators. In many cases, under various operating conditions, Ethyl Gasoline has proved to be the most economical gasoline. In reports submitted by these companies the phrases "Longer time between carbon removals," "Less gear shifting," and "Saves on Maintenance" occur again and again.

This year—when economies are of extra importance, when Ethyl Gasoline offers you even greater value and higher quality—is the time to try it. Ethyl Gasoline Corporation, New York City.

ETHYL ANTI-KNOCK ETHYL GASOLINE CORPORATION Controls Combustion



Ethyl fluid contains lead

© E. G. C. 1932

ETHYL GASOLINE

Say "I saw it in FLEET OWNER"—It Helps!

Don't buck the current . . . Ride it! *to bigger profits*

State governments are telling you what they require as to brake equipment.

Insurance underwriters tell you what brakes will pass their tests for insuring vehicles and loads. Don't buck this stream—ride it! to bigger profits.

B-K Vacuum Power Brakes do a lot more than satisfy legal and underwriters' requirements. They are *good business,* sensible protection, economical as to operating and maintenance.

B-K equipment settles your brake question permanently and satisfactorily, with these important advantages:

- Low first cost.
- Applicable to any truck, tractor, bus, trailer; fits any type of braking system.
- Instant automatic application and release —brake pedal or hand control.
- Instant automatic remote control of trailer brakes.
- Minimum added equipment, light weight; no maintenance.
- Extreme simplicity.
- Original braking system unaffected, unchanged.

On new equipment, specify B-K Power Brakes; and B-K brakes can be easily, economically put on any truck or bus. They are standard equipment on several leading makes.

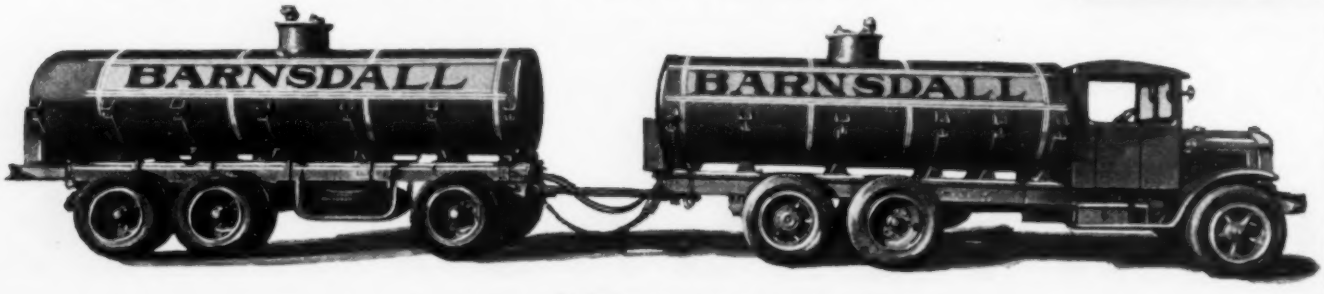
To modernize and legalize your present brakeless trailers, ask your B-K distributor about Timken Trailer Axles—ready now for all types and sizes of trailers. Or write us for full information.

BK VACUUM BRAKE BOOSTER
A BENDIX PRODUCT

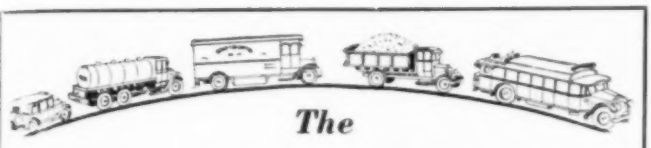
BRAGG-KLIESRATH CORPORATION

South Bend, Indiana

IN CANADA: ECLIPSE MACHINE CO., Ltd., Walkerville, Ont.
(SUBSIDIARIES OF BENDIX AVIATION CORPORATION)



Say "I saw it in FLEET OWNER"—It Helps!



The

FLEET OWNER

Published Monthly in the interests of Automotive Fleet Owners who maintain their own Repair and Service Shops and devoted to the better Operation and Maintenance of Truck, Trailer, Bus, Passenger Car, Taxicab and all Automotive Fleets.

Vol. 8 New York, March, 1932 No. 3

THE NEW YORK PUBLIC LIBRARY 646374 A ASTOR, LENOX AND TILDEN FOUNDATIONS

Table of Contents

We Standardize	Editorial	19
Are Stock Records Necessary?	Chas. S. Lyon	10
How We Cut Maintenance Costs	Moss Patterson	12
Good Maintenance Means Safety	Fred C. Oldham	16
Minimizing Icy Pavement Skids		20
Building an Ice-Cream Body	Owen C. Jones	24
Question-of-the-Month		26-31
Servicing Timken Brakes		32
Does Free-Wheeling Affect Batteries?	H. D. Wilson	36
Solving the Trailer Brake Problem		38
Bulletin-of-the-Month		40
Motor Fuel Keeps Body Cool		42
Trouble Shooters' Department		45
Reader Say-So		47
Diesel Truck Makes Record Run		48
Trailer Has Plymetl Panels		48
International's 1½-Tonner		49
The Chevrolet Trucks for 1932		49
Motor "Lorries" by Autocar		50
P. A. Will Now Build "to Order"		50
Stewart Offers New 2-Tonner		51
"Armorply" for Panel Bodies		51
New Merchandise for Road and Shop		52
Index to Advertisers		54

Published Monthly by

The FERGUSON PUBLISHING COMPANY

90 West Street, New York City

ARTHUR D. FERGUSON
President

A. L. CONLEY
Sec. and Treas.

HENRY CLAY FISCHER
Editor

Chicago Representative: D. B. TROTT
840 Montrose Ave. Phone Long Beach 2331

Subscription: $1.00 Yearly; Single Copies 10c.

Member of Controlled Circulation Audit, Inc.

(Copyright 1932 by The Ferguson Publishing Company)

18,099 AUTOMOTIVE "WHOLESALE CONSUMERS"

Verified by CCA

Such is the Extent of the Automotive Fleet Market Which is Made Up of Approximately 1,500,000 Vehicles and Covered Monthly by

"FLEET OWNER"

A Word About the "C. C. A."

C. C. A. means "Controlled Circulation Audit," an organization composed of manufacturers, advertising agencies and publishers, the object of which is to make available verified circulation information on publications having free or "controlled" circulation.

Since FLEET OWNER is a controlled circulation publication, we lost no time in joining the C. C. A. and point to our "Charter Membership" with pardonable pride.

Our C. C. A. membership gives manufacturers and advertising agencies the opportunity of obtaining definite confirmation of circulation and actual figures on coverage claimed.

Copies of our C. C. A.-audited Circulation Statement are free for the asking. The immenseness of the fleet market and other information it contains, make interesting reading.

Ask for Complete Details of this Huge Coverage

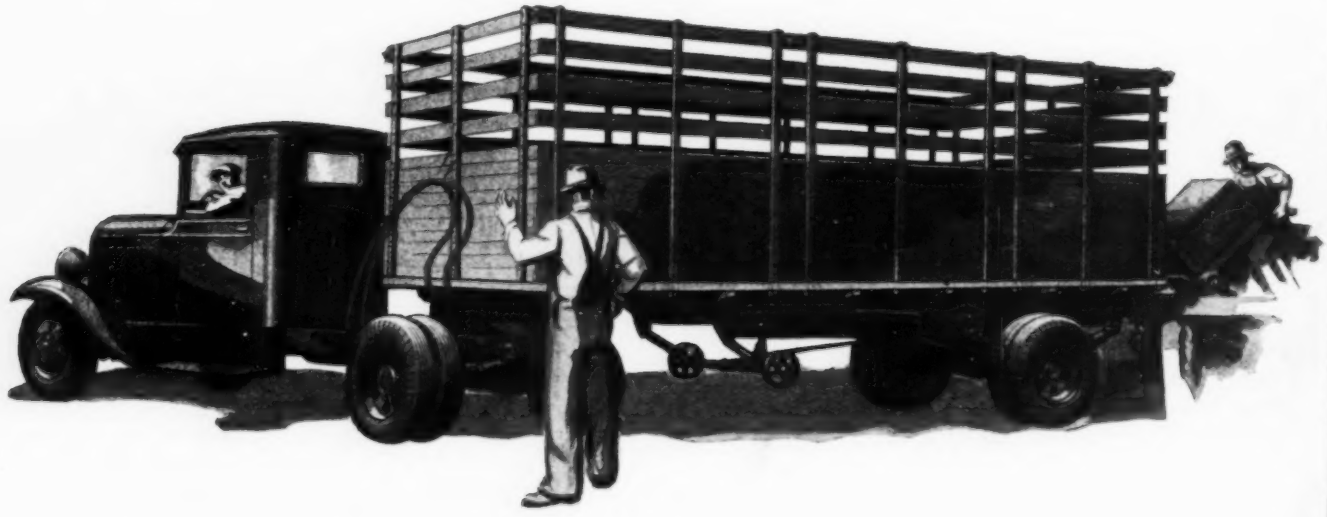
"FLEET OWNER"

Charter Member, Controlled Circulation Audit, Inc.

The Ferguson Publishing Co.

90 West Street New York, N. Y.

HATS OFF TO REO



"Hats off to Reo!" Truck owners are writing in from all over the world to express their appreciation of the extraordinary ruggedness and superb performance of the 1½-ton Reo SPEED WAGON. Find out about this truck before you buy!

THE NEW 1½ TON

REO SPEED WAGON

REO MOTOR CAR COMPANY
LANSING • TORONTO

$625

Reo Trucks and Speed Wagons range from 1½-ton to 4 tons. Prices $625 to $2800. Chassis f. o. b. Lansing.

New Tractor-Trailer unit—1½—4-ton Tractors with matched semi-trailers, gross capacity—16,000-35,000 lbs. $1575 and up. Chassis f. o. b. Lansing.

16,000 lbs. gross capacity. 4-cylinder Tractor and Trailer Chassis. Complete with body $1800 f. o. b. Lansing.

Say "I saw it in FLEET OWNER"—It Helps!

VOL. 8
NO. 3

The FLEET OWNER

MARCH
1932

We Standardize

THE present trend towards Standardization is one of the factors responsible for the enlargement of this publication, which makes its bow this month in the new, standard magazine size. We know you'll like it.

Coincident with this increase in size comes a different format—different type-faces, different illustrative style and a different make-up. No change is contemplated, however, in the character of Editorial Content that you are accustomed to reading in this publication, except, of course, such improvements and refinements towards editorial excellence that shall naturally follow.

Regardless of change in appearance, FLEET OWNER shall continue its devotion to the "Better Operation and Maintenance of Truck, Bus, Taxicab, Passenger Car and all Automotive Fleets." Every effort shall be put forth to maintain the widespread reader interest and acceptance that you Fleet Maintenance Men have manifested during the past three-and-one-half years.

We still believe that Fleet Maintenance Men are best fitted to discuss the subject of Fleet Maintenance (professional writers notwithstanding) and shall therefore continue to publish an interchange of ideas and experiences contributed by men who are actually doing this important branch of automotive work. And this means that every reader is cordially invited to participate at any time.

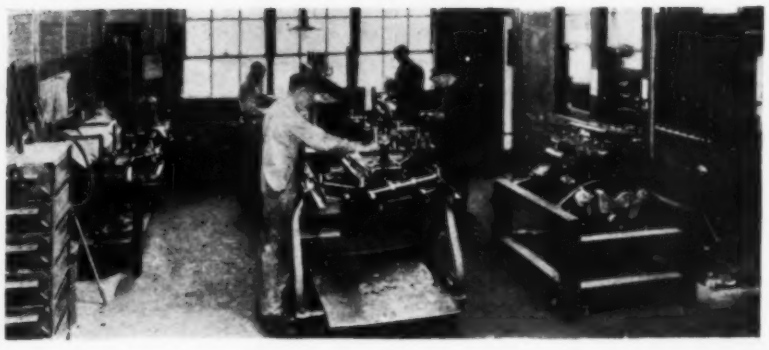
Being but human, we appreciate a little praise (or criticism) once in a while, and shall therefore look forward to the receipt of any comment that may be forthcoming. We know you'll like the new order of the day.

Henry Clay Fischer, Editor.

P.S. We are still located at 90 West Street, in the City of New York.

Are Stock Records Necessary?

By Charles S. Lyon,
(Motor Haulage Company, Inc., Brooklyn, N. Y.)



WE operate some 250 pieces of equipment, about 92 per cent of which consists of 5-ton vehicles or over. Since we are in the hauling business and depend entirely on our fleet of motor trucks as our livelihood, it is not operated by us as a "necessary evil" but purely as our whole source of revenue. In order to operate efficiently we must of necessity pay a great deal of attention to the maintenance and operation of our fleet, and above all, the parts that go into the various trucks.

We have the conventional stockroom, the steel bins, etc. These bins are placed longitudinally or cross-wise, according to light conditions and stock-room areas. We have a visible index system and a perpetual inventory. A periodic inventory is taken by the accounting department, but we shall not touch on that subject or any of its details at this time.

Because of the efficiency of the various parts sources that we have to depend on, we have, within the past few years, been able to reduce our inventory from approximately $120 worth of parts per vehicle, to $60 worth of parts per vehicle—at least that amount of parts was on our books the first of November, 1931, when inventory was taken.

With relation to stock-keeping, there is one problem on our minds at the present time which perhaps will prove to be a boomerang, but we believe it at least worthy of discussion, and that is the matter of the *cost* of keeping these records. In our small parts department, the accounting cost alone, to keep these parts, to balance our stock record, to keep the inventory and to make up our statements, etc., amounts to approximately $5,000 per year. This cost is of course *non-productive* stock accounting.

As before mentioned, the parts that we use are solely for the purpose of maintaining our fleet of trucks, and we are wondering whether or not it would be practical to do away with our stock records entirely; to disburse our parts by means of a requisition from the foreman to the mechanic and to take a quarterly inventory? The difference between our book value of the first quarter and the second quarter could then be charged up to vehicle classification—classification as heavy-duty truck, heavy-duty tractors and semi-trailers, heavy-duty trailers, etc. This would save us a considerable amount of money, because we do not make any profits out of the parts carried in stock.

We know that there are many operators who might say, in reply to this suggestion: "But you will lose control of your parts." We say "No, we do not lose control of our parts, we merely put more faith in our personnel—and we now have 100 per cent faith in them—we know that they will not smuggle parts out, that they won't steal the parts, and that the parts won't have 'wings.'"

When we take into consideration the amount of money we spend for non-productive labor to keep the men in our stockroom department honest—that is what we actually keep the accounting records for—from a fleet operator's standpoint—we wonder whether or not it is worth it? Our theory is to have implicit confidence in our men, and throw the stock card system out, thus eliminating considerable expense.

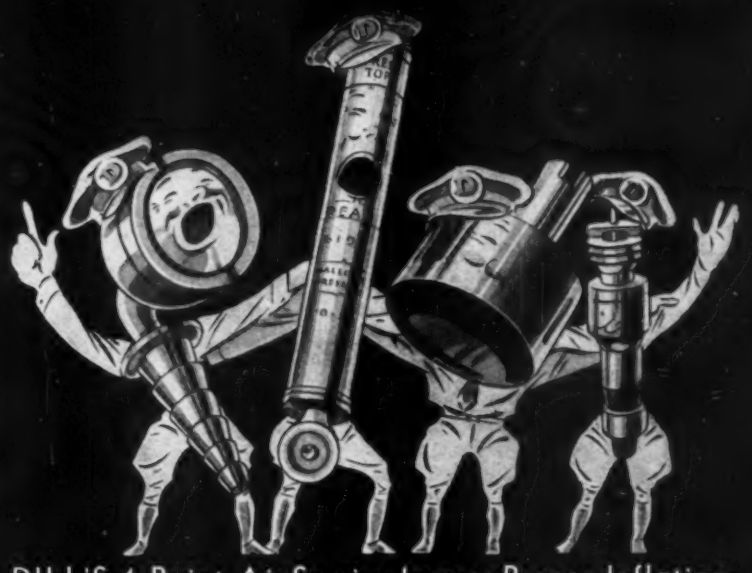
Perhaps in an organization such as the American Railway Express, the Gulf Refining Company, or the Standard Oil Company, with larger and more scattered fleets, this scheme might not work out practically, but speaking from our standpoint—where we operate under one roof as a base for repairs and confine our activity within a three-state area, we believe the idea is worth considering.

Another of our main difficulties in our small parts department is the question of obsolescence. It seems that the manufacturers of motor trucks, cars, parts and accessories, might be able to establish a little closer liaison between the fleet operator and his main distributing points in disseminating information to the fleet operator

(Please turn to page 37)

"We Are Wondering Whether or Not It Would be Practical to Do Away With Our Stock Records Entirely—This Would Save Us Considerable Money."

THE FOUR AIRMEN
for better air service



DILL'S 4-Point Air Service Insures Proper Inflation, Most Quickly, Checked Accurately, Sealed Tightly

DILL Super-Service Air Chuck. Insures quicker inflation.

DILL Instant-Air Tire Gauge. Parts completely enclosed. Guaranteed one-pound accuracy.

DILL Super-Seal Valve Inside. Fastest inflating valve inside made.

DILL Super-Seal Valve Cap. Swiveled rubber seal—holds air.

PROPER TIRE INFLATION
Cuts Maintenance Costs

How much money has "tire trouble" cost you—in tire repairs and in the loss of profitable running time?

Improper inflation—tires not properly inflated and checked—tires that have leaky valve insides or no valve caps—are at the bottom of most tire trouble.

Use The Four Airmen and stop throwing this money away! They're the *best* you can use—for they're made by Dill—and they'll keep *all* your tires ready for full service, *all the time.*

Insist on The Four Airmen from your local jobber or rubber company branch.

Mail the coupon *today!*

THE DILL MANUFACTURING CO., Cleveland, Ohio

Akron • Detroit • Los Angeles • Toronto

Used and Recommended by the Makers of Over Fifty Million Tires a Year

DILL

TIRE VALVES AND ACCESSORIES

I want to cut maintenance costs with The Four Airmen. Send me your latest descriptive literature and an order blank.

Name _____

Address _____

City _____ State _____

Say "I saw it in FLEET OWNER"—It Helps!

Reducing Bus Maintenance Costs

By Moss Patterson

President, Oklahoma Transportation Co., Oklahoma City.

Operator Tells How Efficient Lubrication, thru Oil Reclamation, Brought About Substantial Savings in Fleet Maintenance

OUR fleet consists of approximately fifty-two busses, ranging all the way from twelve-passenger busses up to twenty-nine passenger busses. We are operating about 6,400 miles per day, or 180,000 miles per month, with our entire system more than 1,225 miles in length.

The busses are inspected after each run by regular inspectors, both at night and during the day. A large blackboard is installed in our shop, with information kept up-to-date showing the exact mileage that each bus was greased, oiled, etc. We believe that we have one of the most efficiently operated shops in the industry, and beyond a doubt, one of the cleanest.

During the summer, oil is changed after 1,000 miles of service and in the winter after 700 miles of service. We have no way of testing the crankcase oil to see if it needs to be changed, and for that reason we stick religiously to these mileage periods. Crankcase oil is saved and reclaimed on a Skinner oil reclaimer.

We have never installed a single piece of equipment on which there was as much opposition from our various departmental heads, as there was in the purchase of our oil reclaimer. This opposition, no doubt, was built up as a result of the publicity given to the slogan "Change oil at least every five hundred miles" by automobile and equipment manufacturers as well as by oil refiners. We found, however, after using this piece of equipment for seventeen months, that it has saved us more money than any single piece of equipment we have ever purchased.

In addition to saving money, the laboratory analyses have indicated that our oil *increases in quality* with each reclaiming, instead of deteriorating.

It is costing us approximately .0981 per gallon to reclaim this oil and our equipment during the seventeen months has never given us the slightest trouble nor have we been out one penny for replacement parts for this outfit, other than replacing the filter pads at regular intervals.

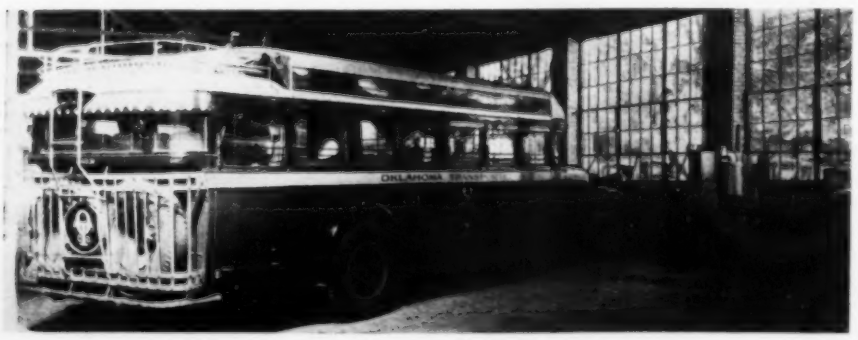
In connection with lubrication, it is interesting to note that some of our 29-passenger busses (such as is illustrated on this page), equipped with large motors, have never used any kind of oil except oil that has been reclaimed. Some of these busses now have mileage records of more than 150,000 miles before needing a major overhaul. This is a much better record than we were able to establish when we used new oil exclusively.

The figures shown in the cost table appearing on this page, beginning with July 1, 1930 and ending with November 30, 1931, on both cost of lubrication and cost of maintenance, prove conclusively that any fleet operator can realize the same savings that we have made, by oil reclamation.

Of course, all of this saving has not been brought by oil reclamation alone, but it is my belief, gained from this data and experience, that we have made a net saving of one-half cent per bus mile on our operation since we began reclaiming our oil. Since we have averaged approximately 180,000 bus miles per month, this means a net saving of approximately $900.00 per month for the past seventeen months.

A Few Interesting Cost Figures:

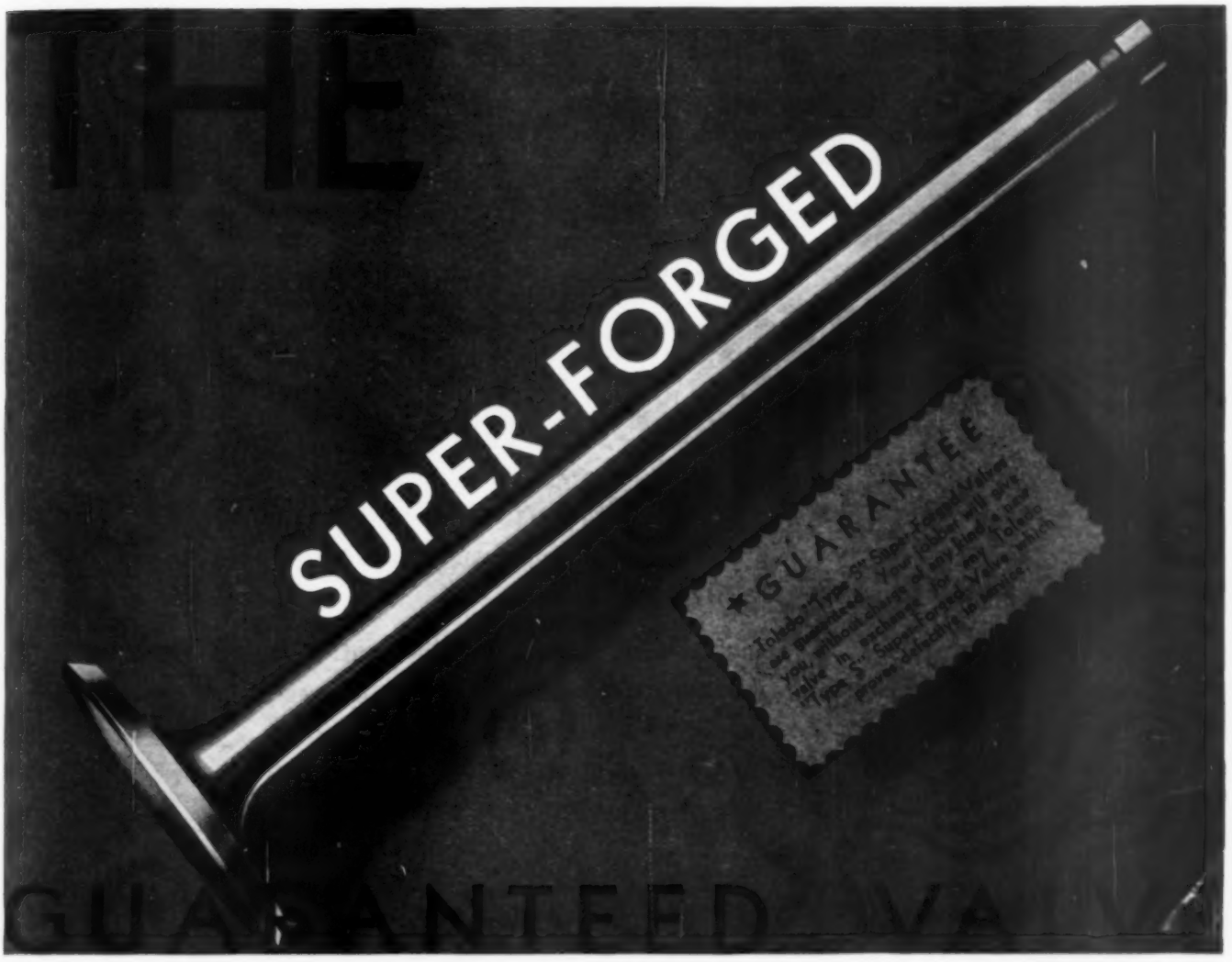
Month and Year	Lubrication Cost Per Bus Mile	Maintenance Cost Per Bus Mile
July, 1930	.0044	.0484
August, 1930	.0025	.0458
September, 1930	.0029	.0403
October, 1930	.0019	.0459
November, 1930	.0027	.0395
December, 1930	.0024	.0326
January, 1931	.0028	.0280
February, 1931	.0036	.0305
March, 1931	.0018	.0294
April, 1931	.0016	.0331
May, 1931	.0021	.0294
June, 1931	.0019	.0275
July, 1931	.0021	.0291
August, 1931	.0022	.0307
September, 1931	.0024	.0340
October, 1931	.0018	.0258
November, 1931	.0017	.0258



The Best Teacher

FLEET Maintenance Men will agree that "Experience is the Best Teacher." Here's the experience of one operator that is truly worth publishing. The table above should prove interesting.

At the left is shown one of the vehicles in this fifty-two vehicle bus fleet. The oil-reclaiming apparatus used, is shown at the right of the picture.



TOLEDO VALVES are standard equipment on the following:

AUBURN • FRANKLIN
REO • HUPMOBILE
GRAHAM • DE VAUX SIX
STUTZ • DURANT
MATHIS
FEDERAL TRUCKS
CONTINENTAL MOTORS
BUDA MOTORS
LYCOMING MOTORS
STERLING MOTORS
VAN BLERCK MOTORS
LEROI MOTORS
ADVANCE-RUMELY TRACTORS
ALLIS-CHALMERS TRACTORS
MASSEY-HARRIS TRACTORS
J. I. CASE TRACTORS

WHY PAY MORE?

What more can you get in any valve than a guarantee by a reliable, reputable manufacturer? Fleet owners know that new, untested experiments in valves, as in other things, are dangerous and raise cost of upkeep. What you want is a valve you can depend on. No matter what you pay, you cannot get any more than a guarantee. When you install Toledo Valves in your fleet, you know they will stand up and give long dependable service.

The Toledo Steel Products Company, Toledo, Ohio, U. S. A. • New York, 17 W. 60th Street • Chicago, 1225 South Wabash Ave. • Atlanta, 279 Ivy Street, N. E. • Dallas, 2805 Commerce Street • Kansas City, 14th and Oak Streets • Oakland, 3103 Adeline Street • Los Angeles, 216 N. Alameda Street Toronto, 2-10 Breadalbane Street

TOLEDO

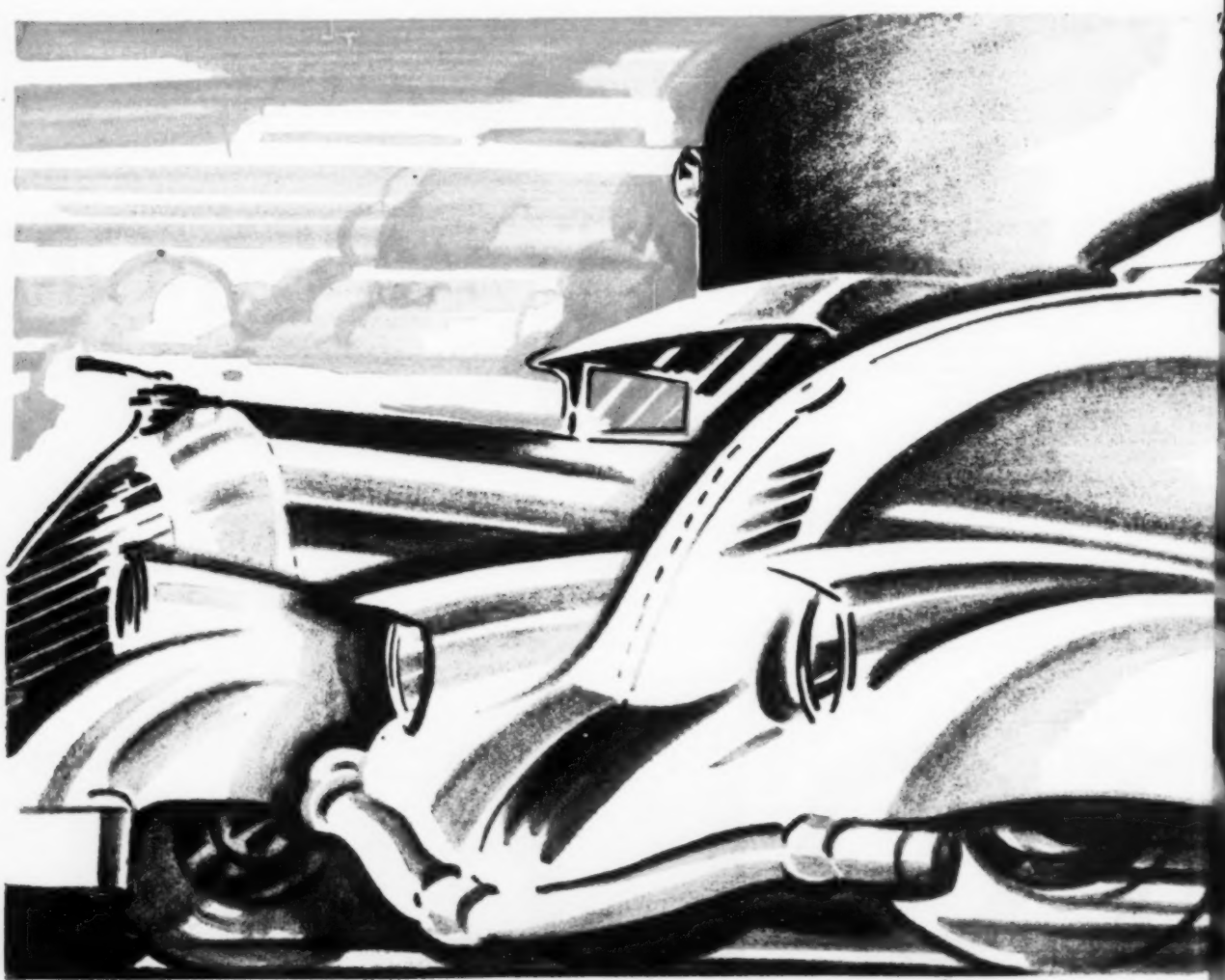
Say "I saw it in FLEET OWNER"—It Helps!

Thermoid

Parallels Bus and Truck Factory Development . . .

Side by Side—neck and neck—always abreast! Describe it as you will—Thermoid is never a step behind those bus and truck manufacturers who lead in the industry.

Buses and trucks yet to come may be startlingly different from buses and trucks as we know them today. But when they appear, Thermoid already will have perfected braking materials best suited to their requirements. For the past and present both prove that Thermoid engineers *always* anticipate the need.



Thermoid

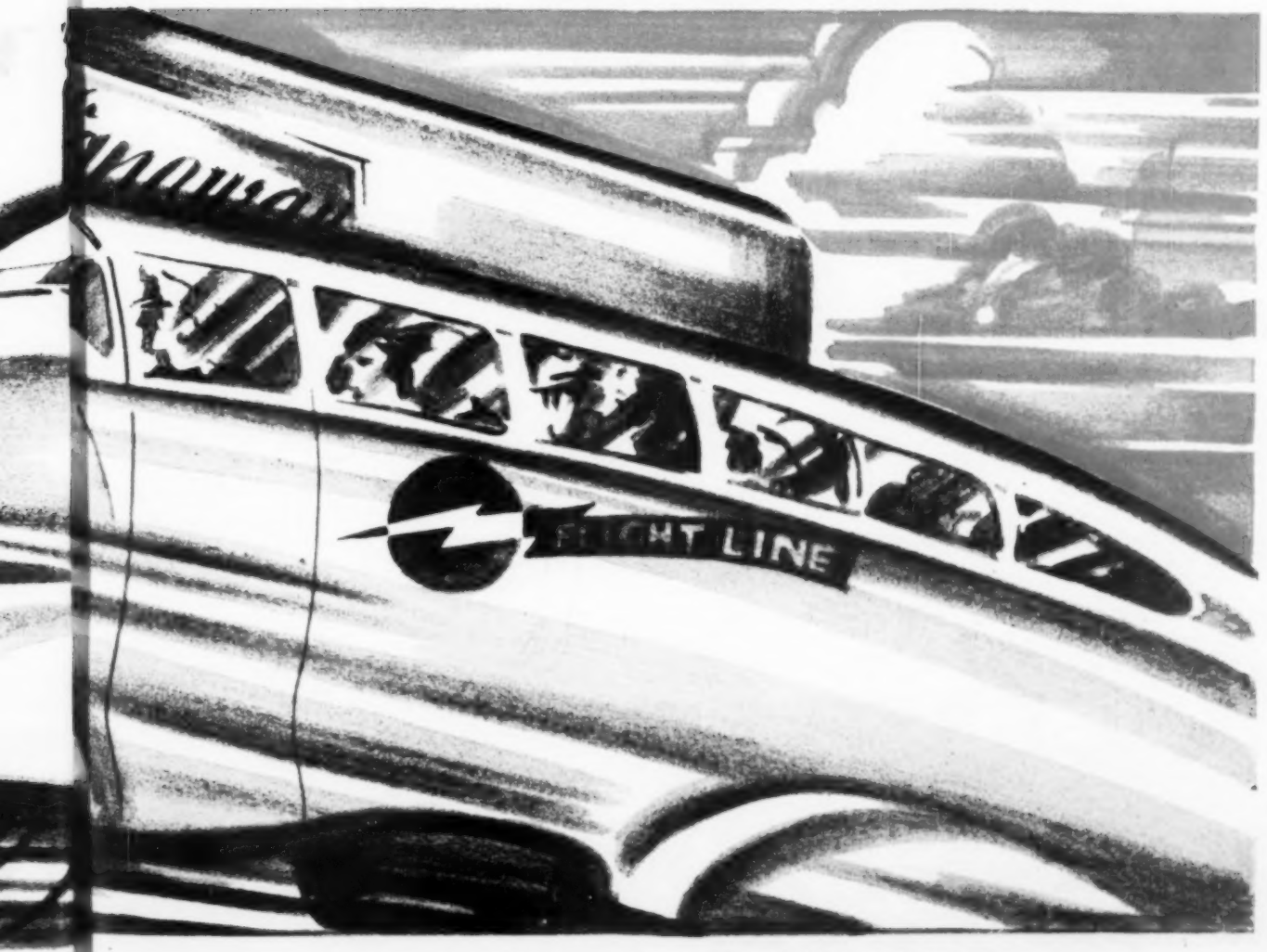
BRAKING MATERIALS

are always miles ahead of the need

Thermoid never waits for the need. Thermoid has always engineered braking materials in advance. That is why Thermoid Brake Lining is continually years ahead of the field in efficiency.

If you are now experiencing a particular brake trouble that looks like it can't be licked, why not put it up to the Thermoid engineers who have made the greatest number of contributions to solving the braking troubles of America?

THERMOID RUBBER COMPANY, TRENTON, N. J.



Good Maintenance Means Safety

Fleet Safety Supervisor Tells Why Good Vehicle Maintenance is a Factor in Safe Distribution

By Fred C. Oldham

(Richards Storage Corporation, Grand Rapids, Mich.)

VEHICLE maintenance should begin the moment a car or truck leaves the factory. The manufacturer stipulates a moderate rate of speed the vehicle should be driven for a certain distance, and the principal reason for that, as I see it, is to keep the car in the best possible working order while being broken in and thus insuring longer life to the vehicle.

Vehicle maintenance is an insurance—a mechanical insurance—and is just as important from a safety standpoint as property damage and public liability insurance, or any of the other insurances you may carry on your fleet. It protects you against unnecessary items of expense that usually crop up when a vehicle is not properly taken care of.

Vehicle maintenance should be viewed in the same light as the Chinese consider their doctors. Chinese doctors are paid by their clients to keep them well. We pay our doctors to make us well—after we have become ill. We wait until we are sick, then call the doctor in and expect him to perform a miracle and make us well over night. The comparison with vehicle maintenance is obvious.

Our method is usually the most costly procedure of the two, and when you let your automobile or truck go so long that it hammers and knocks, and your tires are badly worn, or the car wobbles all over the highway, then you are running true to form with our modern way of thinking, and then you expect the maintenance department to make a brand new car out of a decrepit old wreck.

Just think how much more economical it would be, from the standpoint of the purse, and how much more productive to safety it would be, if you worked on the assumption that your automobile mechanics are trained to keep your automobiles and trucks in first class running order, than to leave it for them to doctor the cars up after they had all gone to the dickens.

When it comes to the subject of vehicle maintenance, I don't doubt for one minute that every fleet maintenance man knows as much, or maybe more than I do, about the care and upkeep of motor vehicles, but you will find when I get further along that there are some points many of you overlook, and the importance of these I would like to drive home to you as emphatically as possible.

Let us consider the various important parts of a motor vehicle, beginning with the motor. From the standpoint of safety, about all I can say about the motor is that all gasoline connections should be tight and there be no leakages. The wiring should be in good order, with the prime idea in mind of avoiding fire. As regards the mechanical set-up and maintenance of the motor, there is no need for us to discuss that because every fleet operator is being continually bombarded with literature, and is being called on by salesmen who keep impressing on him the necessity of using good oil, and of changing the oil every 500 or 1000 miles. They keep your attention attracted to the oil filters, if you use them, and the necessity of changing your plugs every 10,000 miles or so, and your mechanics, if they do what they are paid to do, will see to it that the motors are kept in good running order. This applies also to the transmission and differential.

A fleet owner's natural pride will see to it that the paint jobs and general appearance of his vehicles will look well at all times.

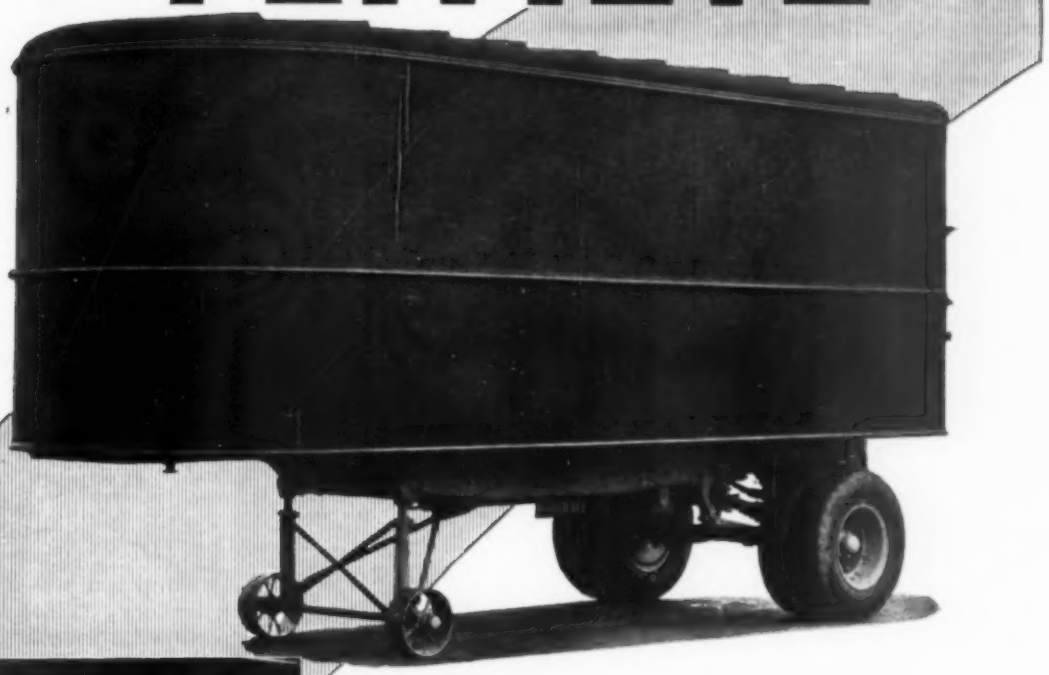
With regard to the tires and batteries, we find we can fall back on the service being rendered by the larger tire distributors, who will on a contract basis make a weekly check of the air in the tires of all your vehicles, check the batteries and fill them with water at the same time. An arrangement such as this is considerably more positive than leaving it to the care of the driver or a garage mechanic.

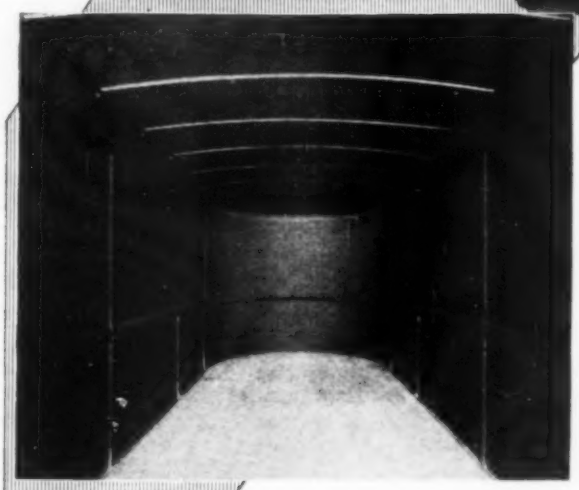
With the laws that are now in effect in a great number of states, we find that periodically the police, with the assistance of the garages, conduct brake testing cam-

(Please turn to page following)

Two examples showing how the use of obsolete equipment and the delay of proper preventive maintenance, are bound to end up disastrously. If in doubt about scrapping or repairing, do it now!

FRUEHAUF *Scores a Hit with* PLYMETL





THE accompanying illustrations show views of a Fruehauf Trailer displayed at the Road Show in Detroit. It made a decided hit because of its advanced design and light weight.

The body specifications tell the story. Although it has a length of 21'6", is 8' wide and 6' high, this body weighs 1500 pounds less than the standard type of van construction for a body of this size.

Fruehauf writes, "This body is sufficiently strong for any reasonable purpose. The PLYMETL paneling has the bending resistance and structural strength enough to carry any load."

Fleet owners are interested in more economical transportation. The saving on tires, gas, and oil justifies their good judgment in specifying PLYMETL.

We shall gladly send details and specifications on this body to interested fleet owners.

PLYWOOD
HASKELITE
PLYMETL

HASKELITE MANUFACTURING CORPORATION
120 SO. LA SALLE ST. CHICAGO, ILL.
New York Distributor: Esdorn Lumber Corporation, Leggett Ave. & Barry St.
In Canada: Railway and Power Engineering Corp. Ltd.

SAFETY *and* MAINTENANCE JOIN HANDS (*Continued*)

paigns. This of course means that brakes will be watched more carefully, the horn will blow when needed, the lights be kept in good working order and properly focussed. You will also find the rear view mirrors are where they belong and the windshield wipers properly working.

Most articles on vehicle maintenance are either of a technical or a mechanical nature. The writer will usually attempt to tell you how a vehicle should be maintained and kept in good running order. This is not the purpose of this paper. It is our desire to look at vehicle maintenance from the standpoint of safety—first, last and always.

Now, inasmuch as a vehicle standing still is not liable to be the cause of accidents, unless improperly parked, we must therefore consider the vehicle in motion. From the time you start your car to drive somewhere, the steering wheel is in your hands at all times and this is the foremost controlling power you have over that tremendous weight which is under you, rolling along over the highway, and which, when not under proper control, is a death-dealing instrument to yourself and others. So when we consider a car in motion we are forced to consider the controlling devices, or the steering mechanism and running gear.

Here is the spot where I place my finger on the motor vehicle and say—"This is what I consider the most important part of the car, and it is that which needs the utmost of attention from the standpoint of vehicle maintenance—a factor in safe distribution."

I will venture to say there is a very small percentage of men who have had the front end or steering assembly of their cars properly checked within the last six months. In spite of the fact that a car may be new and may only have been away from the factory for a short time, a change takes place in the front end of that car that without an atom of doubt, will change the alignment of the wheels.

Two of the reasons that bring about this change are the gradual sag of the springs and the use of the front wheel brakes. The front end of your car is adjusted to within one one-hundredth part of an inch in its angles and connections, when it leaves the factory. Such things as the amount of toe-in, the amount of "pitch" or "camber" and the degrees of "caster" are scientifically figured out by the engineers, and any change from the correct adjustment will gradually bring about that well-known "shimmy," or the car will be found to wander and weave, or a condition is brought about whereby the car has to be continually "steered."

There are hundreds of men driving cars over the highway today with a shimmy in the front end that would do justice to a Hula Dancer, and these fellows either know or do not know why the car is difficult to handle, but the majority of them have enough sense not to allow anyone else to drive the wobbly outfit.

Again, I say, from a standpoint of safety we have got to consider the controlling features of the automobile, and that is the front end. Suppose we consider what may go wrong in this part of the vehicle and the effect it will have on the control of that car.

Twisted axles are very common today and the cause for this is principally due to the front wheel brakes. Just imagine—when you are driving along the highway at 50 miles an hour or so, and you jam on your brakes; what happens? The tendency is for the weight of the car to dive or heave itself forward. This action is upward in the rear and down at the front, and if exaggerated would cause the car to turn end for end. Now, if one of the front wheel brakes grabs before the other, and this can happen very easily, the axle at that spot is going to receive the brunt of the entire weight when the car pitches forward. Therefore with the back pressure of the brake and the dragging of the tire, it is the axle that takes the shock, and there is no small wonder that with this taking place every time you stop the car, that you have twisted axles.

A twist in the axle upsets all the delicately balanced and adjusted steering angles, principally toe-in and caster. And it is this change that brings about such things as shimmy, hard steering, wandering and weaving, cupping and excessive wear of tires, making the car hard to control. It immediately places that car in the category of a hazard to public safety.

We find the most careful drivers today are those fellows who risk their lives on the Indianapolis Race Track. The cars they drive have been designed and built by engineers from a scientific standpoint with the thought in mind of studying the changes that take place in the vehicle after a long grind at high speed. The public greets these contests as sport and they get plenty of thrills at seeing these fellows race madly around the track at a tremendous speed, risking lives and limbs. No one knows what risks they run

(*Please turn to page* 39)

Nine Reasons Why:

1.—Abnormal depreciation of equipment. Frequent accidents increase the maintenance costs and lower the trade-in values of the cars.

2.—Necessity to invest in extra equipment to take the place of that laid up for repairs due to accidents or neglect.

3.—Repairs—Owing to the high cost of collision insurance, few fleet owners carry it and are obliged to stand the cost of repairs.

4.—Damage to cargo being carried. Damage claims result, which are costly.

5.—Accidents cause unreliable delivery which creates ill will on the part of the customer.

6.—Adverse advertising value. Poorly maintained equipment is poor advertising.

7.—Effect on efficiency of drivers. If equipment is not right, drivers are more prone to have accidents.

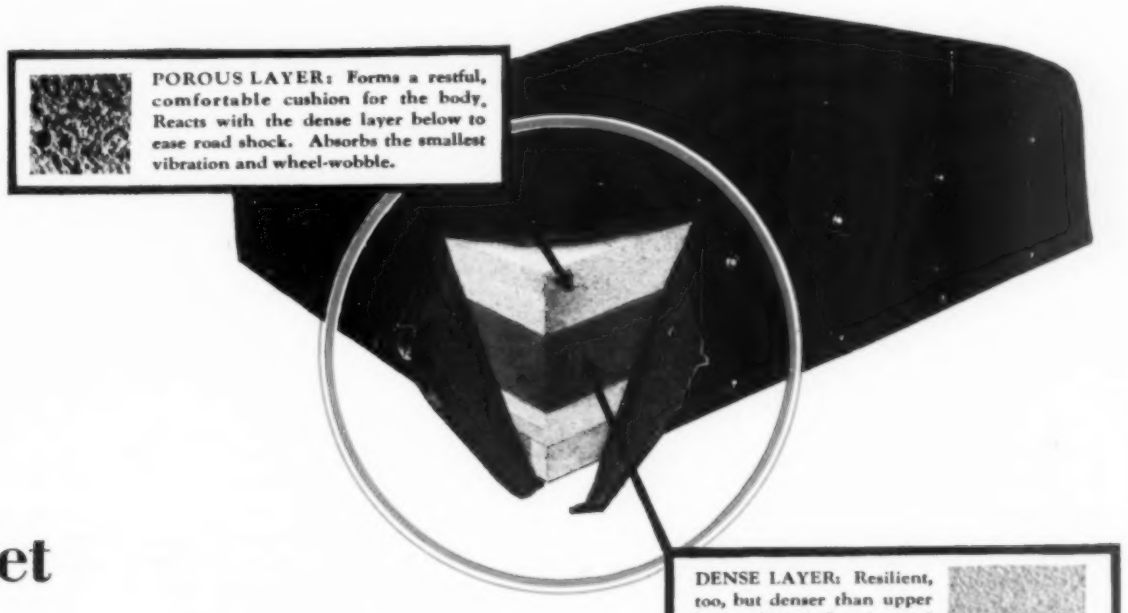
8.—Loss of good will. If the equipment is dangerously or carelessly operated it reflects badly on your company.

9.—Increased insurance rates are caused by a bad accident record; and properly maintained vehicles carefully driven will create a saving by decreasing your insurance premiums.

Too often the fleet maintenance man is expected to make a new truck out of an old "load."

RADICALLY NEW

Scores of Fleet Operators Acclaim This Safer, Efficient, Longer Lasting Seat


POROUS LAYER: Forms a restful, comfortable cushion for the body. Reacts with the dense layer below to ease road shock. Absorbs the smallest vibration and wheel-wobble.
DENSE LAYER: Resilient, too, but denser than upper layer. Absorbs heavier road shock. Prevents that "Jack in-the-box" catapulting motion, as well as side-sway. Gives the driver a sense of security and firmness in driving.

Let SPONGE-AIRE Save *Your* Seating Dollars

You can't wear out sponge rubber by sitting on it. No . . . and you can't find another material with the substantial softness and shock-absorbing properties of sponge rubber. That's why Sponge-Aire, the brand new idea in truck seats, is a "natural" for every fleet operator. Built of generous layers of tough sponge rubber cemented firmly together, and protected by a durable fabric cover, a Sponge-Aire seat actually outwears the truck. Easily lasts ten to twelve times longer than an ordinary coil cushion. *Specify Sponge-Aire and cut that recurring repair and replacement expense.*

In addition to saving you many maintenance dollars, a Sponge-Aire seat safeguards your driver's health and efficiency. The millions of tiny air bubbles act like miniature shock absorbers, eliminating the gruelling shocks and vibration that injure the spine and kidneys and tear down efficiency. *That's what fleet owners mean by "Sponge-Aire Comfort": the kind that prevents drowsiness and keeps a driver comfortably alert!*

Of course, it cuts down accidents . . . Send coupon for the complete Sponge-Aire story.

SPONGE-AIRE SEAT COMPANY Inc.

1437 MAIN STREET BUFFALO, N. Y.

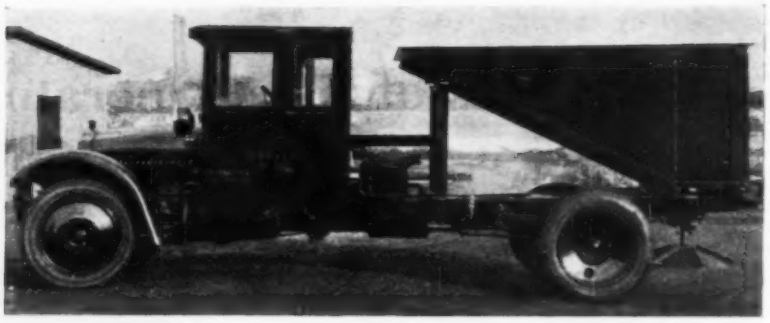
Sponge-Aire Seat Company,
1437 Main St., Buffalo, N. Y.

Gentlemen:
May I have the complete story on Sponge-Aire Seats? No obligation, of course.

Name..... Address.....

City..... State.....

Minimizing Icy-Pavement Skids



THE hazard caused by slippery roadways is one of the important problems demanding the attention of fleet maintenance engineers at the present time. When it is realized that the lives of the public and much equipment are endangered, it becomes most essential to find a solution to this problem at once. The formation of ice on the pavement surface offers one of the worst conditions and most difficult to combat. The problem of securing satisfactory traction so that travel may proceed safely requires the prompt and careful attention of the engineer, or other official under whose jurisdiction this subject comes.

Materials such as coarse sand or cinders, thoroughly embedded in the ice so as not to be easily blown off the surface by the wind or thrown off by vehicles, have been found the most useful to secure satisfactory traction. Cinders have proven to be probably the best material available, but due to the difficulty of obtaining them, coarse sand or similar materials are often substituted. (The above is recommended in conjunction with a good set of tire chains, of course.—Editor.)

In embedding the material in the ice it is necessary to have a partial thawing of the ice. Calcium chloride salt has been found to be one of the most practical agents for melting the ice so that the coarse sand or cinders will be embedded properly, thereby providing ideal traction.

In connection with the manner in which this calcium chloride, salt, sand or cinders is to be economically distributed, it will be of more than passing interest to note the method practiced by a large fleet operator in Ohio, the Northern Ohio Power & Light Company of Akron.

When their motor coach chasses become obsolete, they are used to advantage as salt or sand spreaders, or for other utility work around the operation properties. The illustration at the top of this page shows an old White motor coach which is used as a salt or sand spreader. It was a very simple matter to cut down the long wheelbase and make the necessary changes.

In this particular outfit, a power take-off was installed on the transmission and this was connected to a three-speed Chevrolet transmission, which in turn is connected through a driveshaft to a Ford axle mounted vertically in the truck. The upper part of the axle carries a wrought-iron wheel for breaking up the salt or sand, the lower end driving a cone for spreading the anti-skid material.

By the use of the touring car transmission, any speed can be obtained regardless of the movement of the truck. A tapered steel box holding about three tons of sand or salt is mounted on this truck. There is also a lever arrangement which controls the flow of salt or sand, so that the driver has full control of the distribution at all times.

There are three salt-sand spreaders of this type in use by the Northern Ohio Power & Light Company. They salt or sand the points where the motor coaches have to stop, and also the hills. Although Akron is a very hilly city, they have not experienced much difficulty with skidding in the last four years, according to P. V. C. See, Superintendent of Equipment.

It is believed that the following general suggestions offer the best methods for the treatment of icy pavement surfaces. They emanated, originally, we understand, from the Highway Research Board at Washington, D. C., after having cooperated with various engineers interested in this common problem, and having studied their various methods and the results obtained.

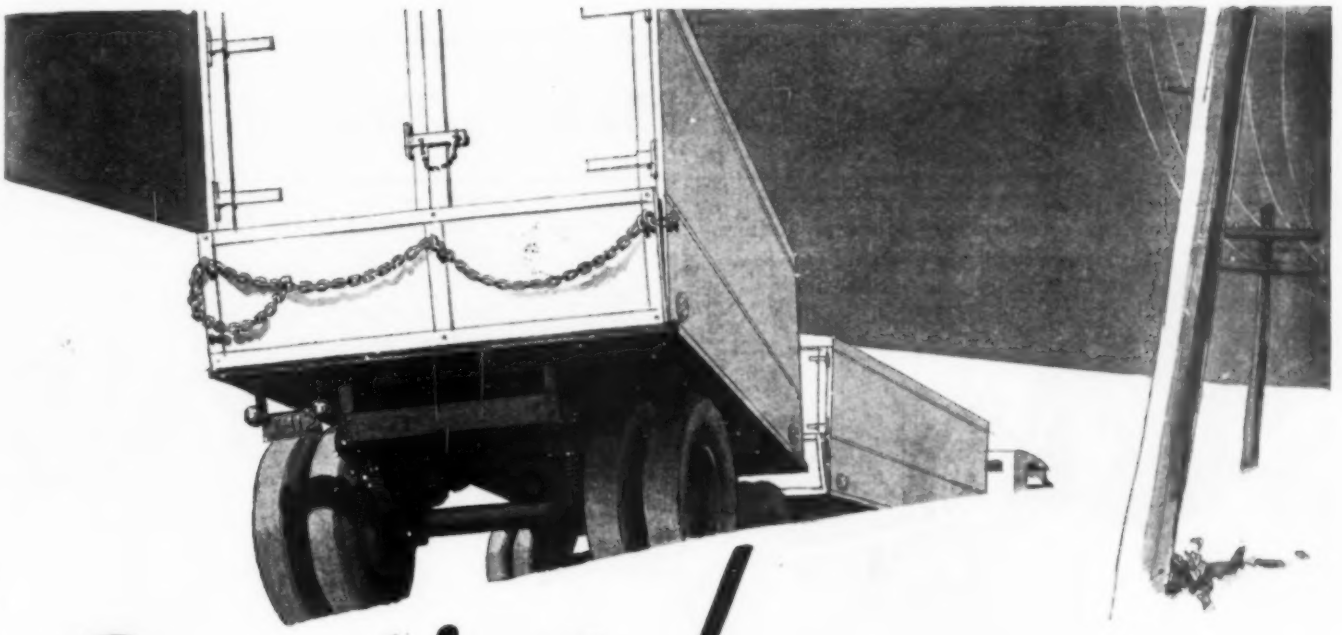
Materials: Cinders are preferred, though coarse sand is most generally used due to its availability.

Preparation: Storage piles of materials should be placed at convenient locations, particularly near grades or curves where traction will be most needed. Sufficient calcium chloride should be spread over the surface of the material to prevent freezing . . . from twenty-five (25) to fifty (50) pounds per cu. yd.

Application: At time of application the material should be treated with (50) pounds of flake calcium chloride per cu. yd. Distribution may be made by hand from trucks, but this method is slow and the results uneven; the use of sand spreaders offers much more expediency and is recommended where considerable amount of surface is to be covered. The treated material should be spread at the rate of 1½-2 pounds

(Please turn to page 41)

A winter scene that is not uncommon. Accidents of this kind are the direct result of lack of tire chains, lack of attention to bad spots on icy pavements and sometimes indifferent driving or a combination of all.



Caution!

...HIGH EXPLOSIVE

If you operate trailers which have no brakes, it's most natural for you to consider putting brakes on them, just as they are.

Caution—don't try it; *loaded with dynamite!*

There's just one safe, practicable way to modernize brakeless trailers—and that is to put under them new axles equipped with proper brakes.

Timken Trailer Axles are designed and built for the expressed purpose of making it easy and economical for you to change your trailers to up-to-date transport units, meeting all requirements of state laws and insurance underwriters. They are *good* axles—Timken quality in every respect; with *correct* brake mountings, for any type of brake.

For modernizing trailers Timken Trailer Axles are sold, installed, and serviced by the authorized distributors of Bendix-Westinghouse Automotive Air Brake Company, Pittsburgh, and Bragg-Kliesrath Corporation, South Bend, Indiana. Get in touch with your local distributor, or either of the above companies.

THE TIMKEN-DETROIT AXLE COMPANY, *Detroit, Michigan*

TIMKEN AXLES

Say "I saw it in FLEET OWNER"—It Helps!

TOM AND JERRY — *Tom sells Jerry the*

"Say Jerry, these new truck tires sure are great stuff. This man-killer of mine rides like a Rolls Royce now."
"Yes, Tom, I know. This repair shop begins to look like a morgue. Nobody hollers about loose bodies or hinges any more. Broken parts are a thing of the past."
"You're right, Tom. These new tires are a big step ahead. It's tough on me though. If this keeps up I'll have to start taking in washing."
"Say, what are you fellows talking about, anyway!"
Goodrich Silvertown
MANAG

THE New Goodrich Silvertown Truck Tire is not just "another model." Three years of intensive research in which eighteen types of experimental tires were produced and run 1,257,000 test miles, lay behind it.

We mean it when we say this new Silvertown will deliver MORE miles, FASTER miles, SAFER miles, CHEAPER miles, than any truck tire ever before built.

Your nearest Goodrich Distributor will back up these claims — show how the new Silvertown can lower *your* costs — increase *your* trucks' efficiency. Phone him now. Look under "Tires" in the classified directory.

The B. F. Goodrich Rubber Company, Est. 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Cal. In Canada: Canadian Goodrich Co., Ltd., Kitchener, Ont. The International B. F. Goodrich Corp. (Export).

Goodrich

32,000 Rubber Articles • Goodrich Silvertowns • Zippers • Rubber Footwear
Drug Sundries • Soles • Heels • Hose • Belting • Packing • Molded Goods

Say "I saw it in FLEET OWNER"—It Helps!

Big Idea . . .

"The boss says we've cut road delays nearly in half. I know I can cover more territory now than ever. And I haven't had a breakage claim or late delivery since we changed over."
"THE NEW GOODRICH SILVERTOWN TRUCK BALLOON!"

Be a Transportation Expert

Learn more about tires — it's a sure way to save money — big money. Get the especially prepared Goodrich Booklet which is full of truck-tire facts that you can put to immediate use. Tear this out — write your name and address on the border, and mail to the Truck & Bus Tire Department, The B. F. Goodrich Rubber Company, Akron, Ohio.

Truck Balloons

Another B. F. Goodrich *Product*

Say "I saw it in FLEET OWNER"—It Helps!

Building *an* Ice Cream Truck Body

By Owen C. Jones

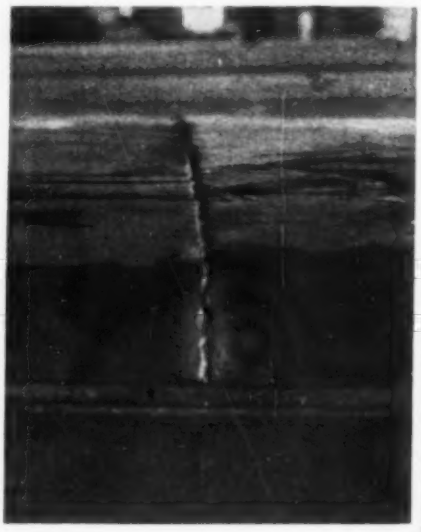
THIS interesting application of both aluminum as a material, and oxy-acetylene welding as a process of body fabrication, should interest all those fleet operators in businesses such as ice-cream, dairies, butchers and others requiring refrigerated or insulated truck bodies. The experience of a large New England ice cream company which manufactures its own truck bodies is here given, with respect to the fabrication of a unit on the type of the one shown above.

This firm recently decided to reduce the body weight of new units by substituting 18-gauge aluminum sheet for iron. By so doing, it is now possible to use either a 2-ton instead of a 2½-ton chassis for the truck, or to carry heavier pay-loads with present 2½-ton chasses.

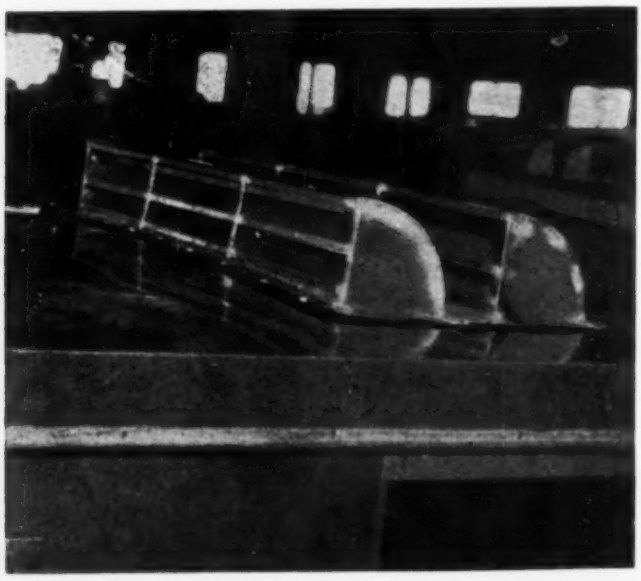
Each body of this type contains a small refrigeration unit. The bodies themselves have capacities of about 500 gallons of ice-cream and each is divided into three compartments: one in the rear for empty cans; one in the front for the refrigeration unit; and one in the center, the largest, for the filled ice-cream cans. The refrigerating unit, mounted in the front, as may be seen above, is operated either by a small gasoline engine or electric motor, which circulates methyl chloride through the coils in the ice-cream chamber.

The process of oxwelding has been applied to the fabrication of the roof seams, the ventilators, the expansion valve drains, and the incidental joints at other parts of the body. Incidentally, this process was the means of solving an important problem in the construction of the roof of this truck, which was done in the company's own body shop.

The bending brake at the plant was too small to accommodate the size of sheet required. At the suggestion of the aluminum manufacturer, who knew how easily aluminum could be oxwelded, the roof was made in two sections and oxwelded together across the center, as shown. The front and back ends of the roof also were oxwelded to their respective end-pieces. As a result of oxwelding, it has been possible to make one-piece roofs which are neat, permanent, and absolutely immune to leakage. Although the roof alone required about 25 feet of welding, its fabrication and installation on the truck was completed in about 5 hours.



Close-up of the center seam of the truck roof, showing how it was oxwelded together.



The double ventilator which extends across the front end of the roof is almost entirely fabricated by oxwelding.

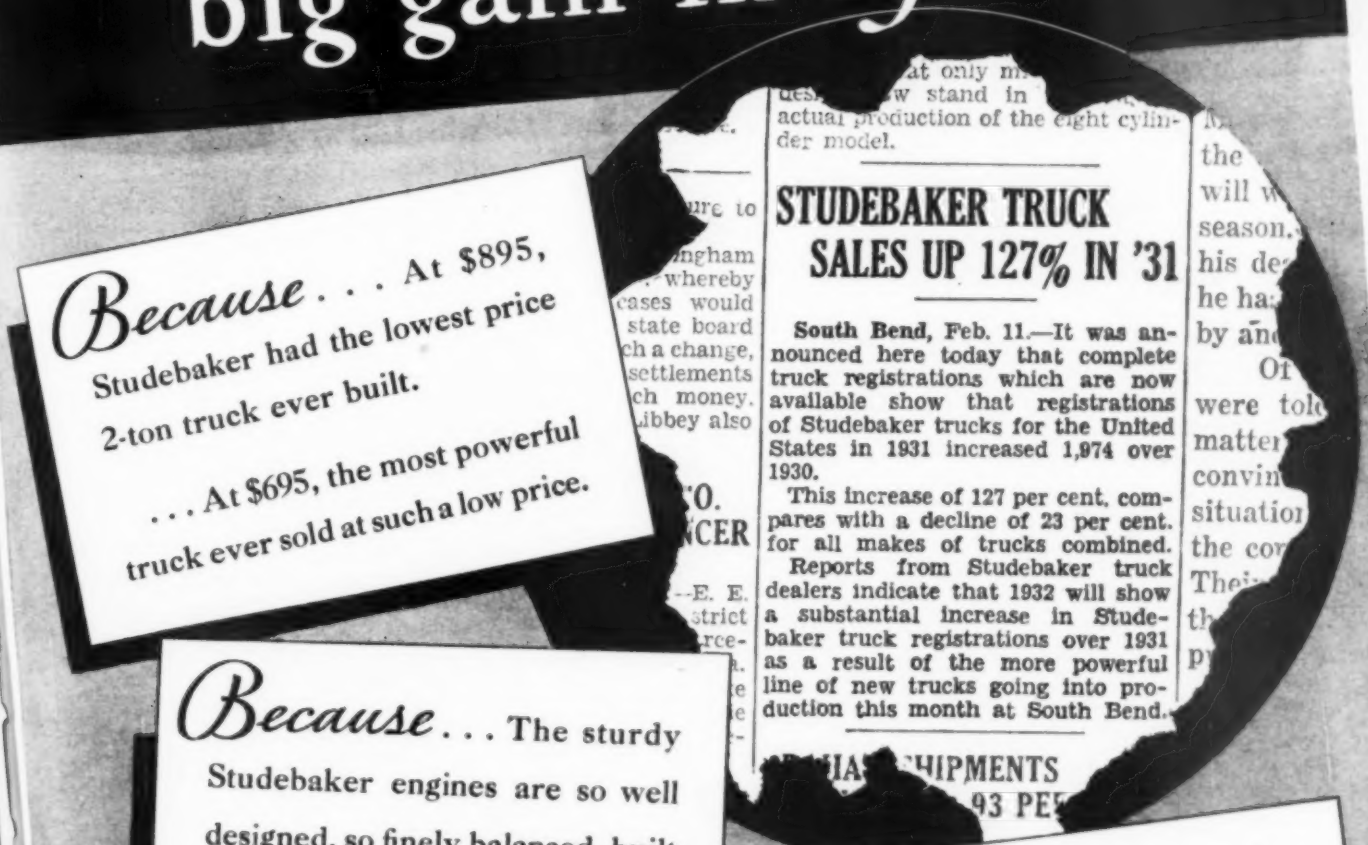
The double ventilator which extends across the front end of the roof is almost entirely fabricated by oxwelding, having oxwelded seams, corner joints and braces. Constructed in this way, the ventilator cannot work loose and rattle as a result of the vibration to which it is subjected.

The expansion valve drip pan is shaped from light sheet aluminum and has several welded joints. The purpose of this pan is to drain away the water which forms when the ice around the expansion valve melts. Although very thin metal is used for this part, its oxwelded joints give it added strength and protect it from damage.

In the empty-can and refrigeration unit chambers, several small corner joints are oxwelded. One of these can be seen in the upper right corner of the opening at the front end of the truck. It will also be noted that the supports under the refrigeration machine are welded together. A large drip pan extending the whole length of the body also is oxwelded at all joints.

(*Please turn to page* 37)

Why did Studebaker MAKE THIS big gain in 1931?



actual production of the eight cylinder model.

STUDEBAKER TRUCK SALES UP 127% IN '31

South Bend, Feb. 11.—It was announced here today that complete truck registrations which are now available show that registrations of Studebaker trucks for the United States in 1931 increased 1,974 over 1930.

This increase of 127 per cent, compares with a decline of 23 per cent. for all makes of trucks combined.

Reports from Studebaker truck dealers indicate that 1932 will show a substantial increase in Studebaker truck registrations over 1931 as a result of the more powerful line of new trucks going into production this month at South Bend.

Because . . . At $895, Studebaker had the lowest price 2-ton truck ever built.

. . . At $695, the most powerful truck ever sold at such a low price.

Because . . . The sturdy Studebaker engines are so well designed, so finely balanced, built with such extreme precision that they develop a full flow of economical power at low engine speeds:

35 H. P. at 1200 R. P. M.

50 H. P. at 1760 R. P. M.

60 H. P. at 2180 R. P. M.

75 H. P. at 3200 R. P. M.

And now in 1932 . . . Studebaker adds the world's lowest price 3-ton truck, $1350 at factory, with B. K. booster brakes and auxiliary transmission as standard equipment.

STUDEBAKER *Trucks*

Say "I saw it in FLEET OWNER"—It Helps!

QUESTION *of the* MONTH

"By far, one of the most valuable departments to be found in any automotive publication. Every fleet man should be delighted to cooperate."—A Reader

Here Are a Few Representative Answers to Question No. 17:

Manual-Control Shutters Preferred

"OUR busses are equipped with manual-control shutters which we find have considerable advantages over the automatic type, inasmuch as we have never in the past found an automatic type which could really be called dependable. With the manual-controlled shutters, which our drivers are trained to use in conjunction with a dash type moto-meter, the temperature of our motors is kept at 180 deg. Fahr. the year round. By the use of these shutters and by keeping our engine temperatures at the above mentioned point, we have reduced our crankcase dilution to a point of never over three per cent, thereby making a great saving in wear on our motors. We have also increased our gasoline mileage about 1½ to 2 miles to the gallon.

"With use of these radiator shutters, a motor is warmed up to the proper operating temperature in a shorter length of time and gives snappier and better performance throughout the run. Consequently, radiator shutters, properly used, make a great saving in both oil consumption and crankcase dilution, which means longer-lived motors and better gasoline mileage."—*R. W. Kelly, Supt. of Transportation, Iowa Southern Utilities Co., Ottuma, Iowa, operating a fleet of 23 busses.*

Bus Fleet Completely Equipped

"ALL of the 131 busses in our fleet are equipped with radiator shutters, some of which we buy from the Electric Service Supplies Company. We prefer the automatic type, as the manually-operated ones often break the control wires. Shutters certainly offer many advantages, including the maintenance of the correct motor operating temperature. We see no reasons why shutters should not be used in cold weather."—*J. C. Bowles, Garage Superintendent, Community Traction Co., Toledo, Ohio, operating a fleet of 131 busses.*

Wants Shutters for Old Models

"ABOUT 75 per cent of our fleet of trucks and passenger cars is equipped with radiator shutters. We prefer the automatic type on passenger cars and the manual type on trucks. The chief advantage of shutters is that they shorten the warming-up period. We think that shutters, properly used, keep the motor at proper operating temperature, which means a saving in fuel.

"We have had difficulty in getting shutters for some of our older trucks. They probably are not manufactured to suit 1918-20 2-ton trucks. All of the shutters we are using came on the cars and trucks as standard equipment."—*J. W. Crawford, Purchasing Manager, Schluderberg-Kurdle Company, Baltimore, Md., operating a fleet of 41 trucks and 34 passenger cars.*

Automatic Type Preferred

"WE use radiator shutters on all passenger cars and trucks which are originally equipped with them at the factory. We, however, have discontinued purchasing shutters for equipment not originally supplied with same, and use merely a shield over a portion of the radiator for cold weather driving.

"From our experience with shutters we prefer the automatic type, as this eliminates one operation for the driver and gives better temperature control. The manual type is used on several of our trucks and has been found fairly satisfactory. The latter, of course, is a much cheaper proposition from the standpoint of original cost.

"We have found that radiator shutters do not necessarily provide easier starting but will cut down the warm-up period and provide more nearly correct operating temperature. The result of the above naturally gives less crankcase dilution and some saving in gasoline.

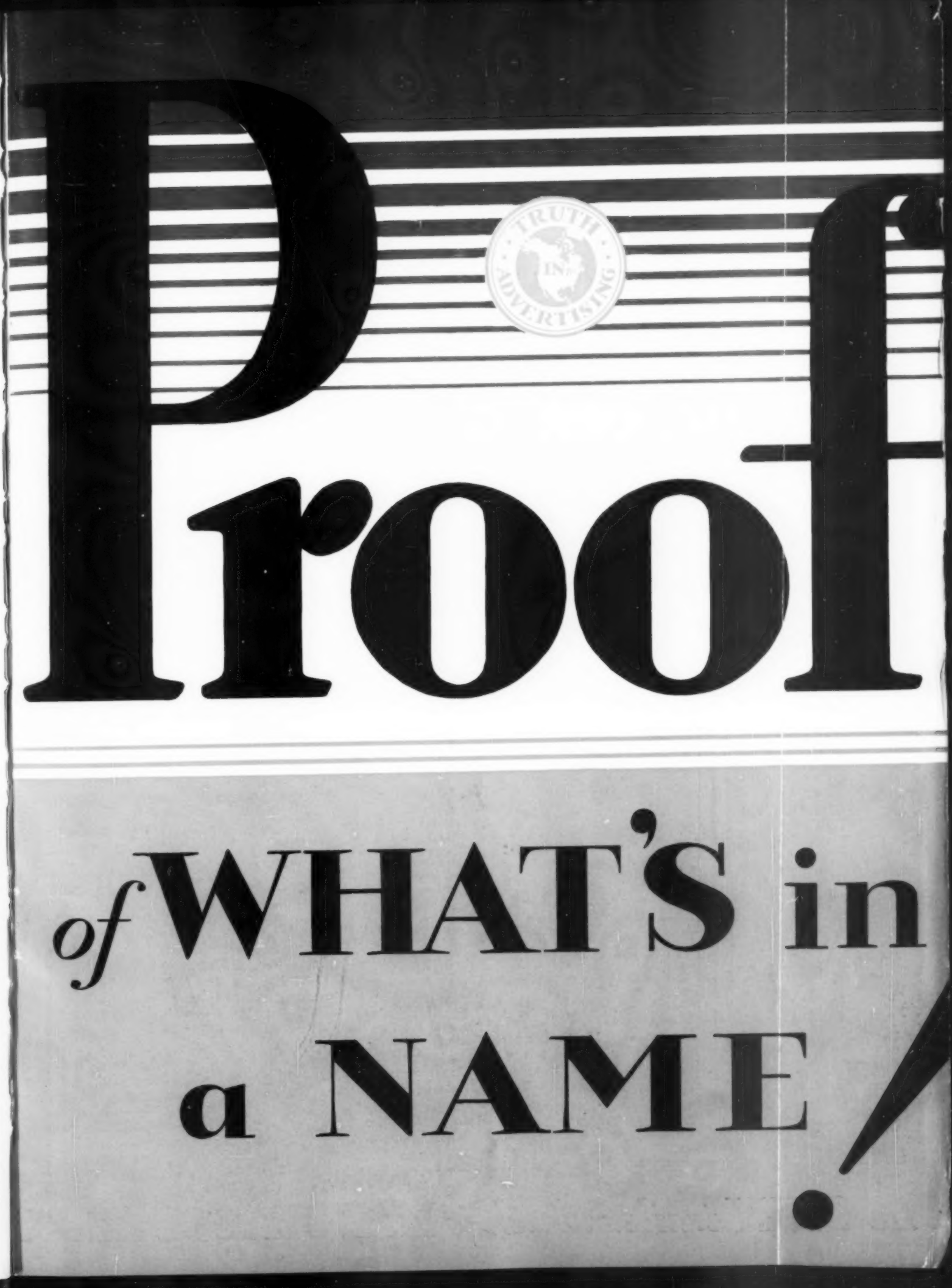
"We have questioned somewhat the overall saving in the use of winter-fronts, especially where alcohol is used as an anti-freeze. The loss of anti-freeze is somewhat increased and the investment and maintenance of automatic winter-fronts runs fairly high. We are, therefore, attempting to obtain some of the advantages of shutters by using a permanent shield over a section of the radiator core. These shields are inexpensive and last the life of the car, at the same time being very simple to install."—*G. A. Hogg, Supt. of Transportation, Scranton Electric Co., Scranton, Pa., operating a fleet of 30 trucks and 46 passenger cars.*

Shutters Prevent Road Failures

"ABOUT 90 per cent of our fleet is equipped with radiator shutters, including the trucks, busses and passenger cars. We prefer the manual-controlled type, as the automatics do not always work properly. Shutters do provide quicker warm-up, correct operating temperatures and reduction of crankcase dilution. In fact, we have had several failures traced directly to the above this winter, on vehicles not shutter-equipped.

"Since all of our equipment is stored in warm garages, no other methods are used to keep the motors warm. Shutters are not used on those vehicles not in active service all winter. We buy shutters through automotive jobbers. Can see no other reasons why shutters should not be used during the cold months."—*E. R. Swanson, Division Engineer, Wisconsin Power & Light Company, Fond du Lac, Wis., operating a fleet of 75 trucks, 90 busses, 200 passenger cars and 10 other vehicles.*

(*Please turn to page* 31)


Proof
TRUTH IN ADVERTISING
of WHAT'S in a NAME!

HIGHWAY Pioneer *the* Tra

BASIC CONSTRUCTION

EXCLUSI HIGH

SEMI-TRAILERS

Year after year of experience has conclusively proven the value of simplicity in construction. Highway still leads the way with springs without shackles, radius rods that are adjustable and fully oscillating, spring bolts that have never been hammered or bent and modern weather proof brakes.

FIFTH WHEELS

With self-locking jaws that grip a forged steel and heat treated king pin positively and securely around its largest diameter allowing perfect lubrication and eliminating wear—Highway again leads the way.

1ST

AXLE BEARINGS

Twin bearings for dual tires with spring proof axle bed sections, heat treated and oil quenched in one operation to eliminate uneven tire wear are original and exclusive Highway features.

1ST

ROUND END VANS

More miles per gallon of fuel—a result of less wind resistance, more loading space and better appearance were introduced by Highway in their round front body construction.

HIGHWAY TRAILERS

The **ONLY** *trailer which is* **MANUFACTURED COM**

oneered *and* Developed *every step of*
Trailer Industry *and* Today *it has*
ON FEATURES *which are*
USIVELY
HWAY

CARRYALL

A size and type for every need, capacity from 10 to 100 tons with lower loading height, roller bearing fifth wheels and modern brake equipment. Whether you load from side or rear Highway leads the way with an improved and unexcelled construction.

DROP FRAME

Lower loading height, lower center of gravity without sacrificing strength or weight in both rolled steel and automotive type frames, typify Highway's originality to pioneer and to be prepared for present and future trailer requirements.

1ST

1ST

INTERCHANGEABILITY

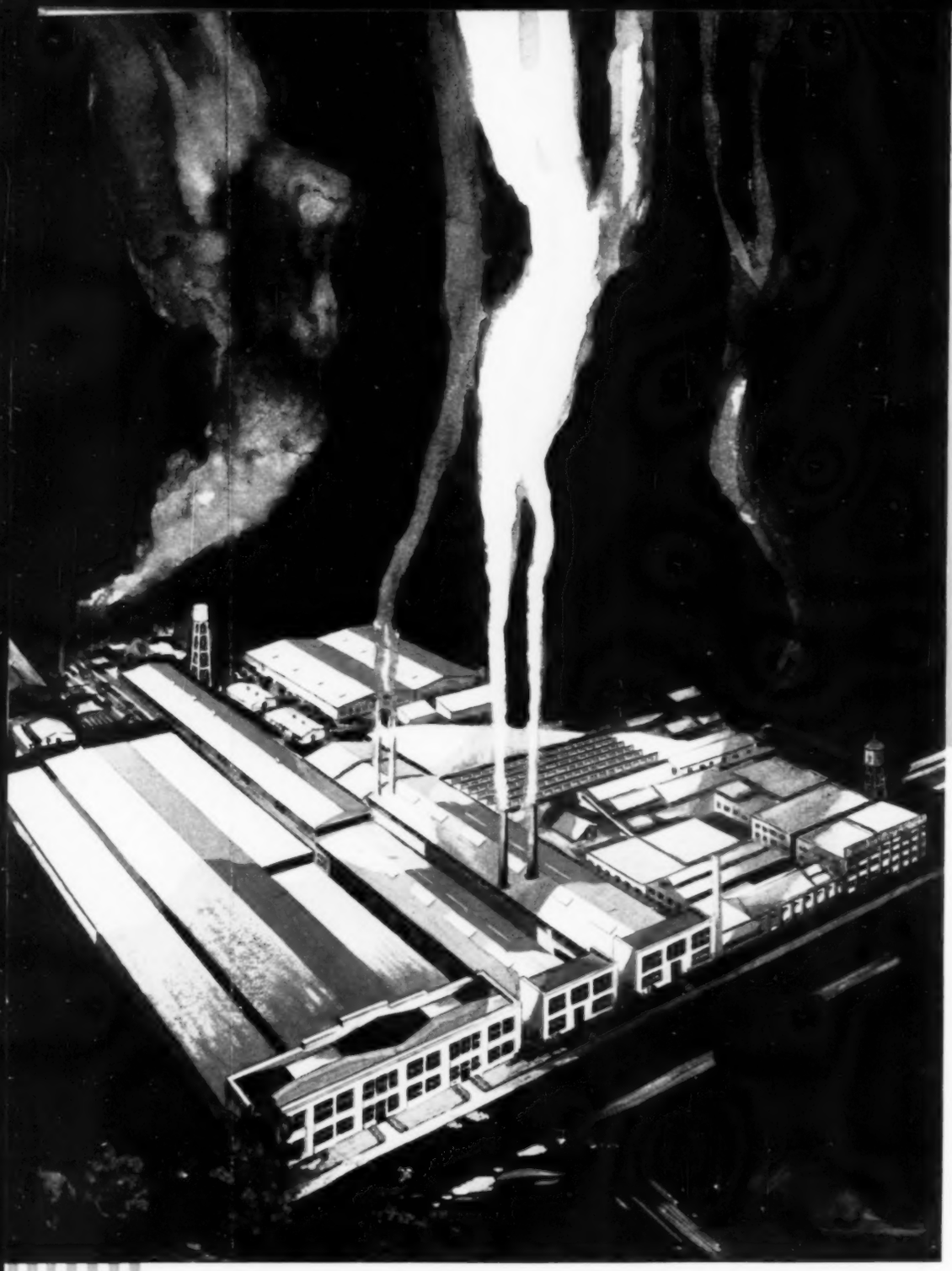
ABSOLUTE INTERCHANGEABILITY between semi and full automatic units is an exclusive Highway feature. You cannot afford to build up a fleet without full assurance of this feature. Insist on a standardized lower fifth wheel that does not confine you to a single source of supply on your future purchases. Again Highway leads the way.

FULLY AUTOMATIC

And now Highway leads the way with the *first and only* 100% cab controlled power brake equipped full automatic semi-trailer. The driver positively does not leave the seat in coupling or uncoupling of trailer. Power brake fittings are absolutely automatic. Highway continues to lead the way.

HIGHWAY TRAILERS

O COMPLETE *from raw material to finished product*



1,000,000 square feet devoted to Trailer Manufacturing owned and operated exclusively by

HIGHWAY TRAILERS

The World's largest Custom Body *and* Trailer Plant

HIGHWAY TRAILER COMPANY

Main Office and Plant No. 1, Edgerton, Wisconsin
Plant No. 2, Stoughton, Wisconsin

ADVANCED TRANSPORTATION

QUESTION - *of* - *the* - MONTH CLUB (*Continued*)

"A Bee Line for Shutters"

"OUR entire fleet is fully equipped with shutters, 100 per cent. Both the automatic type and manual type are good, with good drivers. All the advantages mentioned in the questionnaire are gained, naturally, from the use of shutters, because it takes less time to warm up the motors with them installed. In real cold weather we close up the hood louvres to keep the motors warm, in addition to using the shutters.

"We make our own shutters for the older busses and those that are not factory-equipped with them. Most of the new vehicles are, however. We see no reasons why shutters should not be used."—*W. J. Moeller, Supt. of Maintenance, Bee Line, Inc., Rockville Centre, L. I., N. Y., operating a fleet of 125 busses, 8 trucks, and 12 passenger cars.*

More Trouble Than They're Worth?

"PERHAPS you'll think I am all wet on the subject of shutters, but I find that through long trips in all kinds of weather, shutters cause more trouble than they are worth. However, if they can be kept in working order, they are no doubt money-savers, but our weather down here does not require much in the way of heating equipment.

"We have considerable rainy weather, and mud and slush often clog up the shutters, causing the working parts to rust and stick. We use only thermostats in the motors, taking them out in the Spring. In some cases we use anti-freeze, but not very often.

"I enjoy reading your publication and have gotten some very valuable information from it. I am going to explain a little later, some experience of mine with a coil; also with a vacuum tank, which I feel sure other readers will be able to profit therefrom."—*Frank Armstrong, Ponca City Transfer Co., Ponca City, Okla., operating a fleet of 8 trucks and 5 passenger cars.*

100% Shutters on This Bus Fleet

"OUR entire fleet is equipped with radiator shutters, 50 per cent of them having the automatic type and 50 per cent the manual-controlled type. We prefer the automatic type, however, since in some cases the driver will forget to open the manual-controlled shutter and serious damage to the engine may result.

"Shutters maintain uniform temperature which no doubt results in some economy—just how much, we have not determined. Since our busses are stored in a heated garage, no other methods are used to keep the motors warm.

"Some of our shutters are furnished by the bus manufacturers; some come with heating equipment; others we purchase from automotive jobbers."—*E. A. Hoffman, President, Wyoming Valley Autobus Company, Wilkes-Barre, Pa., operating a fleet of 28 busses and 1 truck.*

(Please tear out and mail to The Editor, The Fleet Owner, 90 West St., New York City.)

Question No. 19—Refinishing

How often are your vehicles repainted? .....

What type of finish is used—On wood bodies? .....

(Lacquer, Enamel or Paint) On metal bodies? .....

What methods of painting do you use—Brush? .....

Spray? .....

Both? .....

How do you refinish fenders? .....

How much paint work is done in your own shop? .....

How much is farmed out to paint shops? .....

What equipment have you for paint work? (please list) .....

.....

Is your lettering done by hand? ..... By decalcomania? .....

Do you use decorative decals? ..... Other decorations? .....

Please state (if permissible) what type or make of finish is most satisfactory for general all-around use .....

.....

Do you purchase paints through automotive jobbers? .....

If not, through what other sources? .....

How many vehicles in your fleet?

.....Trucks; .....Busses; .....Pass. Cars; .....Trailers; .....Others.

Help to keep this Department a Success! Spring-Time is Paint-Up Time! Swap Your Paint Experience With Other Fleets.

Name of Firm .....

Address .....

City and State .....

Your Name .....Position.....

Servicing Timken-Hydraulic Brakes

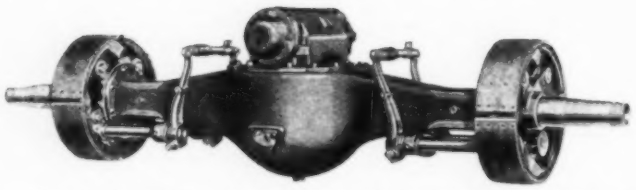


Fig. 1—A Timken Worm-Drive Axle Equipped with Timken Duplex-Hydraulic Brakes

TIMKEN Duplex-Hydraulic Brakes combine the desirable features of the Timken Duplex Brake, described in a previous issue of this publication, with the inherent equalization of the hydraulic system. In addition, the Timken Duplex-Hydraulic Brakes embody other exclusive features which may be briefly outlined as follows:

1. The hydraulic operating cylinder on the axle is not mounted inside the wheel and is therefore not subject to rises in temperature created in the brake drum by braking.

2. The hydraulic brake operating cylinder is mounted on the brake levers and therefore is readily accessible and instantly removable in case of necessity.

3. A simple "micrometer" adjustment is 'built-in" the brake camshaft and levers.

4. May be operated manually as an emergency brake.

5. Timken Duplex Brakes provide heavy duty brakes for hydraulic operation, enabling the vehicle designer to eliminate a considerable amount of mechanical brake hook-up. This brake is as effective under full vehicle load as with no vehicle load as it is not affected by spring deflection or "axle rolling."

Fig. 1 shows a rear view of a Timken Worm Drive Rear Axle equipped with Timken Duplex-Hydraulic Brakes. There is but slight difference between the hydraulic application and the mechanical application of these brakes. Fig. 2 gives us a sectional "close-up" of the brake lever and operating cylinder. With the exception of the camshaft and lever, the Timken Duplex Brake assembly is used. The slightly different cam contour is shown in Fig. 4.

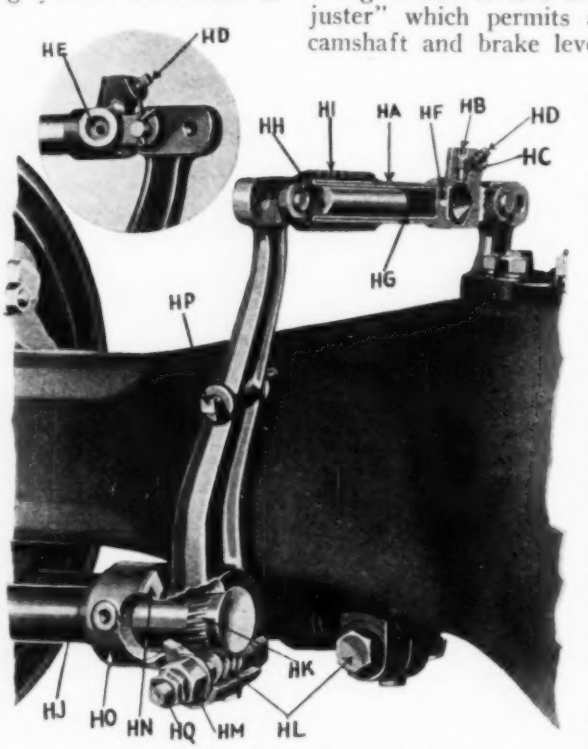


Fig. 2—Sectional view of operation cylinder and brake lever adjusting mechanism of Timken Duplex Hydraulic Brake.

The brake operating cylinder assembly is mounted between the eyes of the two brake levers. A cylinder "HA" provides a cylinder head having a clevis for assembly to the brake lever eye and also provides the necessary inlet connection "HE" for the flexible inlet hose of the conventional "Lockheed" design. This cylinder also provides a bleeder-screw "HB" having a conical valve seat which cuts off by-pass "HC" which is closed by a removable plug "HD."

A rubber piston cup "HF" is fastened to the long tubular piston "HG." The clevis "HH" for assembly to the other brake lever eye has a long stem which slides in piston "HG" and has a shoulder against which the piston acts. An accordion-like rubber boot "HI" protects the cylinder mechanism from dirt, water and other objectionable foreign substances. At the same time, free movement of the piston is permitted. The clevis "HH" can slide outward in the piston without affecting the hydraulic system.

The operating cylinder is very simple and has the minimum number of moving parts. This makes for long life.

Fig. 2 also reveals the construction of the "slack-adjuster" which permits a "micrometer" adjustment of camshaft and brake lever. On the camshaft "HJ" is machined an integral worm wheel shown at "HK." In the hub of the brake lever a worm "HL" is mounted and meshes with the worm wheel teeth. This worm is machined from bar steel and the worm threads are carburized and hardened. This worm also acts as a clamp bolt, firmly clamping the split hub of the brake lever by means of clamping nut "HM" which is threaded on the worm. With the brake lever clamped there can be no relative movement between the brake lever and camshaft. The brake levers are machined from 35 per cent carbon steel forgings. The additional brake lever eye is provided for a manual hook-up for emergency brakes.

The camshaft "HJ" is an integral steel forging. The design of cam contour as shown in Fig. 4 is such as to obtain nearly uniform lift of the cam as it is turned through its angular range of action.

Dirt and water are excluded from the slack adjuster by the closure "HN" in Fig. 2. As with the Timken Duplex Brakes the inner end of the camshaft is supported by a bracket "HO" which is bolted to the axle housing. Both the inner and outer brackets have tapped holes for lubrication fittings.

The brake shoes may be fully enclosed by means of a suitable dust shield bolted to the brake spider. It has already been shown that the brake operating cylinders and slack adjuster are also fully protected against the elements.

The Timken-Detroit Axle Company manufactures this entire brake mechanism together with brake oper-

(*Please turn to page following*)

CUT YOUR OIL BILL

25 to 50%

Part of fleet of 85 trucks of The Exhibitors' Service Company which last year covered a total mileage of 1,800,000. These trucks operated daily through practically every town and hamlet within a radius of 150 miles of Pittsburgh, Pa.

Read What users can tell you about how SKINNER RECLAIMERS are cutting their oil bills—saving them hundreds of dollars in cash . . . and oil!

from Arkansas
"MAKES 50% SAVING IN OIL EXPENSE"—writes Mr. H. Tesch-Woita, Engineer-Mechanic, Scott-Mayer Commission Co., Little Rock.

from Texas
"SAVES 66% IN OIL PURCHASES"—writes Mr. R. L. Whaley, Gen. Sales Mgr., Southwest Dairy Products Co., Dallas.

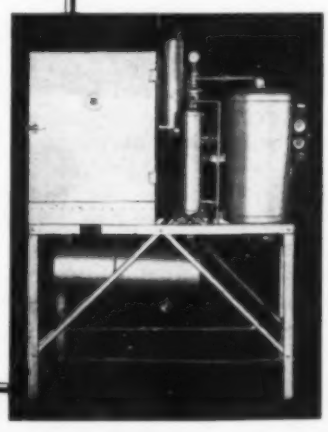
from Ohio
"ACTUAL CASH SAVING OF $866."—writes Mr. E. J. Hukill, Manager, The Southwestern Bus Co., Elyria, Ohio, "in spite of the fact that we switched to an oil at 17% increase in cost."

from New York
"GREAT SAVING IN OUR OIL BILL"—writes Mr. Harold A. Elliott, Vice-Pres. & Gen. Mgr., Eastern Air Transport, Inc., Brooklyn, whose two Skinners reclaimed 5,000 gallons of oil last year.

from Tennessee
"SAVINGS $500 MONTHLY—MAINTENANCE NOTHING"—writes Mr. W. A. Jones, Supt. of Maint., Union Transfer Co., Inc., Murfreesboro.

from Massachusetts
"SAVINGS LARGER THAN ANTICIPATED"—says Mr. Howard M. Booth, Asst. Bus. Mgr., The Worcester Telegram, Worcester.

from California
"SKINNER SAVES US $3600 A YEAR"—reports Mr. H. P. Bell, Vice-Pres., Key Transit System, Oakland.



"Since June 1st, 1931, we have reclaimed over 2,000 gallons of oil," writes Exhibitors' Service Company of Pittsburgh, Pa. (their letter 1-13-32). "For several months we operated entirely on reclaimed oil and our experience was entirely satisfactory."

"Our business demands that we maintain an accurate schedule, and at the same time operate as economically as possible. Naturally we, like every large operator, were interested in reclaimed oil from an economical standpoint—and after thorough investigation, your machine was installed."

If dozens of fleet owners all over the country can cut their oil bills 25% to 50% with a Skinner Oil Reclaimer, you can do the same thing. The right size Skinner in your garage will pay for itself in a year or sooner. These reclaimers are priced as low as $290.

Start turning that wasted oil into profit. Tear out the coupon below and quickly get, without expense or the slightest obligation, actual figures showing what a Skinner Reclaimer will save you in dollars—and oil.

Tear out and Mail with Your Business Letterhead

SKINNER MOTORS, INC.
2229 Dalzelle at 14th St., Detroit, Michigan

Please send us, without obligation, complete information about Skinner Oil Reclaimers. Also tell us definitely with facts and dollars-and-cents figures what a Skinner Reclaimer will save us in cash and oil.

We operate a fleet of (number).....cars.

We purchase approx.....gallons of oil per month.

We drain approx.....gallons of oil per month.

Signed.....Position.....

SKINNER OIL RECLAIMERS

MADE BY SKINNER MOTORS, INC., PIONEERS IN OIL RECLAMATION, 2229 DALZELLE, CORNER 14th, DETROIT, MICHIGAN

Say "I saw it in FLEET OWNER"—It Helps!

A "HOW-TO-DO-IT" ARTICLE (*Continued*)

ating cylinder. The balance of the hydraulic system is obtained through the Hydraulic Brake Company, Detroit, Michigan.

It is evident that the functioning of the Timken Duplex-Hydraulic Brake is exactly the same as with the manually operated Timken Duplex Brake. However, in the Timken Duplex-Hydraulic Brake the foot pedal operates a hydraulic master cylinder. Pressure on the foot pedal moves the piston in the master cylinder and the consequent displacement of fluid is transferred to the brake operating cylinders by means of copper tube piping on the chassis and flexible hose to the operating cylinders on the axles.

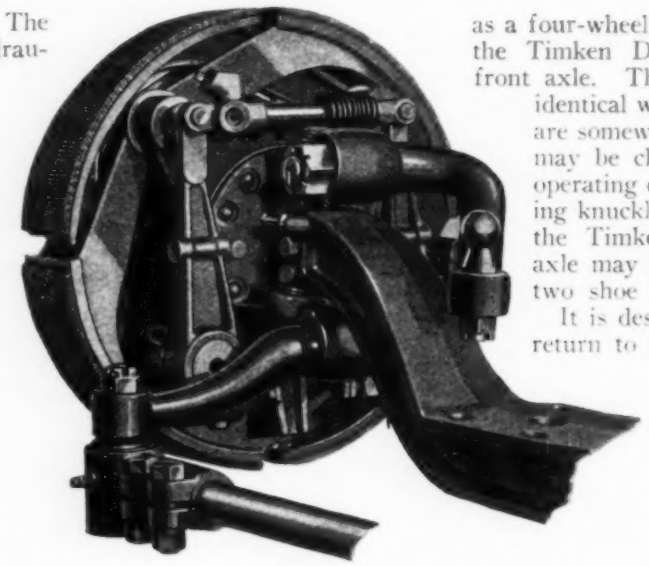


Fig. 3—A Timken Front Axle Equipped with Timken Duplex-Hydraulic Brake.

The brake fluid enters each of the brake operating cylinders between the cylinder head and piston with a resultant movement of the piston and cylinder in opposite directions. Movement of these parts causes the brake levers to rotate with resultant movement of the four brake shoes against each brake drum. As pressure on the foot pedal is increased, the greater hydraulic pressure is built up within the brake operating cylinder and consequently greater force is exerted by the brake shoes against the drum.

It is quite obvious that with four brake shoes acting against 100 per cent of the brake drum surface and with the leverage obtained from the brake levers to the cams, that a brake of maximum effort is the result.

Simplicity of construction of the Timken Duplex-Hydraulic Brake is evident and operation is dependent solely on the fundamental displacement principle of hydraulics. This principle dictates that the pressure exerted upon a fluid is transmitted to all surfaces equally and without loss. Therefore, the pressure applied to the foot pedal is equally distributed between the brake operating cylinders.

When pressure on the foot pedal is released, the springs on the brake shoes retract, returning the operating cylinders to their "off" position, in turn forcing the brake fluid through the flexible hose and chassis piping to the master cylinder.

The Hydraulic Brake Company's master cylinder is so designed that it automatically maintains a constant volume of fluid in the system, compensates for expansion and contraction of liquids due to temperature changes and also replenishes any loss resulting from slight leaks. The master cylinder and supply tank are built integrally.

The recommended brake fluid is "Lockheed Brake Fluid." This is a mixture of neutralized castor oil and denatured alcohol treated with chemical reagents to counteract the action of the fluid on the metal and rubber parts of the system. A substitute may be lacking in these important factors and may do much damage to the system.

The Timken Duplex-Hydraulic Brake may be used as a four-wheel brake system. See Fig. 3, which shows the Timken Duplex-Hydraulic Brake mounted on a front axle. The front brake mechanism is practically identical with that on the rear axle. The camshafts are somewhat shorter in order that the brake levers may be close to the wheel and permit the brake operating cylinder to pass over the front axle steering knuckle. When the rear axle is equipped with the Timken Duplex-Hydraulic Brake, the front axle may be equipped with the Lockheed type of two shoe internal expanding brake, if desired.

It is desirable that the brake operating cylinders return to their original "off" positions after each brake application. This prevents excessive length of piston stroke and the possibility of creating an undesirable vacuum within the cylinder. An adjusting screw "HP" is provided in each brake lever to act as a stop against the axle housing as shown in Fig. 2. A nut is provided to lock this adjusting screw in place after adjustment.

As natural brake lining wear occurs, the brake cam will be forced to rotate through a greater angle, requiring a longer stroke of the operating cylinder.

In order to control the piston stroke to a desirable length, it is necessary to change the relation of the brake lever with the camshaft and this is the reason for incorporating the slack adjuster as illustrated in Fig. 2.

Release of clamp nut "HM," in Fig. 2, permits rotation of the worm "HL" by means of a wrench placed on the hexagon head. This causes rotation of the camshaft with respect to the brake lever. The lock nuts "HQ" prevent threading the worm "HL" out of mesh with the camshaft while adjusting. With the adjustment completed, clamp nut "HM" is tightened and the brake lever is firmly clamped to the camshaft "HJ."

It is essential that air is not present in the hydraulic system because its high rate of compression permits a "spongy" brake. Therefore, at the initial filling of the system care must be taken to remove the air which is present in the form of bubbles. This operation is called bleeding the line and to facilitate this bleeding operation, bleeder screws are provided in each operating cylinder.

Referring to Fig. 2, bleeder valve "HB" is opened by turning the screw. The by-pass plug "HD" is removed and the nipple of a rubber drain tube is inserted. The foot pedal is depressed several times, giving a pumping action which forces fluid to the brake operating cylinder and through the by-pass until there is no further indication of the presence of air in the form of bubbles. Then bleeder screw "HB" is returned to its original position, closing the bleeder valve. The rubber drain tube is then removed and

(*Please turn to page 37*)

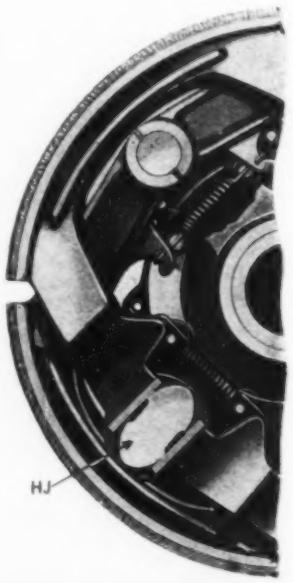


Fig. 4—Sectional View Exposing Anchor Pin and Cam Construction of Timken Duplex-Hydraulic Brake.

WHIRLGAS WHIRLGAS CARBURETOR MIXER WHIRLGAS

MORE MILES PER GALLON
NO CARBON NO FUEL-KNOCK
MORE POWER
PERFORMANCE

INSTANT STARTING

Whirlgas gives to the fuel a mixture of 14 pounds of air to one pound of gasoline, which is the highest efficient explosive point obtainable. It also sets up a cyclonic turbulency, which makes for a quick and complete explosion, causing instant starting even in the coldest weather. This instant starting does away with the frequent choking, thereby doing away with considerable oil dilution, and is less wearing on the discharge of battery.

BETTER ACCELERATION

Whirlgas breaking up the mixture finer, and changing its consistency from a rain like form to that of a whirling fog assures an instant and complete explosion at all times; containing more air it makes the explosion more violent, and thus increases the power of the motor.

BACK-FIRE

Whirlgas precludes the possibility of a flame from back-fire, thereby reducing the danger to life and property.

IDLING

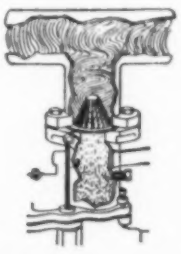
Whirlgas will not only raise the top speed of motor, but will reduce idling speed to a minimum, in the majority of cases cuttingsame in half.

CARBON

Whirlgas, due to the instant quick and complete explosion, leaves no residue or globules of gasoline to burn, harden and form carbon, thus doing away for good with the expensive valve grinds, and keeping the vehicle on the road instead of in the shop.

GASOLINE

Whirlgas accomplishes all the above on the ordinary gasoline, which gives satisfactory performance and a saving over the high priced gasoline, and does away with the necessity of using high test or expensive gasoline in any motor.



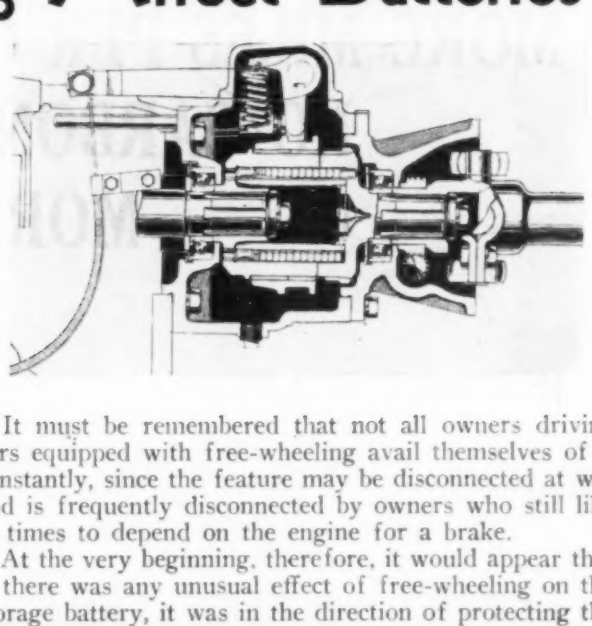
WHIRLGAS FITS IN TIGHTLY BETWEEN THE CARBURETOR AND THE INTAKE MANIFOLD, ACTS AS A SUPER-CHARGER, CUTS DOWN ON THE SMOKE FROM THE EXHAUST, AND REDUCES TO A MINIMUM THE OBNOXIOUS ODORS AND DANGEROUS RESULT FROM MONOXIDE GAS.

Territory open for agents

WHIRLGAS SALES CO.
7237 E. Jefferson Ave., DETROIT, MICH.

Does Free-Wheeling Affect Batteries?

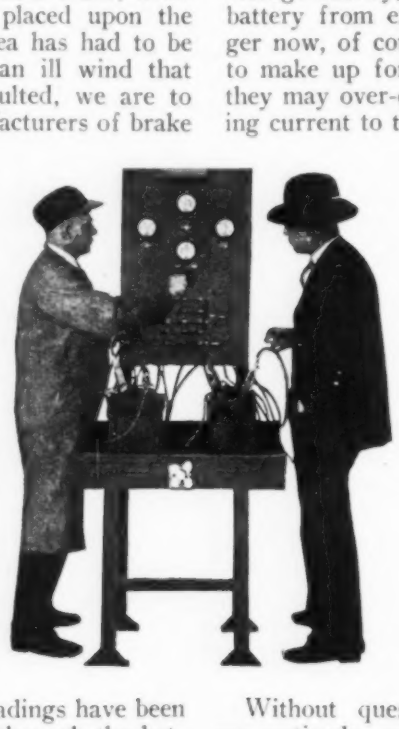
By H. D. Wilson



FREE-WHEELING, in almost universal use today, is a subject of general interest. How its use affects other units is what we are now interested in. The general effect of free-wheeling is that the engine is idling quite a bit of the time and as a result a saving of 20 per cent in oil and 12 per cent in gasoline has been claimed for it.

Because the engine may not be used as a brake, when set for free-wheeling, more work is placed upon the braking system so that the braking area has had to be increased about 20 per cent. "It is an ill wind that blows nobody good" and this has resulted, we are to suppose, in more business for the manufacturers of brake linings, their jobbers and dealers. Further tests have indicated that because of fewer stresses on the engine, transmission and axle parts, the wear on the rear tires is reduced by free-wheeling.

Tests have also shown that, although there is slightly more heating of the cooling water when free-wheeling, because of reduced fan action, no change in the cooling system has had to be made. Any slight disadvantage in summer would prove to be an advantage in winter.



As might be expected, reduced engine speed, during free-wheeling, resulted in reduced generator speed. This of course reduced the output of the generator and resulted in fewer ampere-hours put into the storage battery. In order to study this effect, ampere-hour meters have been put into the charging circuits arranged so that readings have been obtained of the amount of current put through the battery while free-wheeling, as well as in the locked-up position.

From what has been observed, it has been indicated that the "free-wheeling" feature requires about 20 per cent earlier performance of the generator with possibly a slight increase in the maximum output of the generator. This eventually may result in the need for a larger generator for some cars. In addition, there may come a more perfect development of voltage regulators designed to prevent too high a current from going through the battery after the battery has been brought up to a fully charged condition. Thus far, about the only change which has been made is to decrease the generator-pulley size slightly to increase its speed. This, together with the fact that in free-wheeling cars, the engine idling speed is boosted to prevent stalling, seems to have more than compensated for the ampere-hour loss in charging.

It must be remembered that not all owners driving cars equipped with free-wheeling avail themselves of it constantly, since the feature may be disconnected at will and is frequently disconnected by owners who still like at times to depend on the engine for a brake.

At the very beginning, therefore, it would appear that if there was any unusual effect of free-wheeling on the storage battery, it was in the direction of protecting the battery from excessive overcharge. There is the danger now, of course, that in the effort of manufacturers to make up for the lack of charge to the battery that they may over-compensate and provide too much charging current to the battery.

There still is, and probably will necessarily continue to be provided, an adjustment on the generators for adjusting the charge rate to fit the particular driving needs of the individual car owner. Because of this we will probably continue to experience the usual maladjustment of charge rates as has been the case heretofore, with the result that many batteries will be excessively overcharged or over-fed.

This, we commonly know, has the effect of decomposing and evaporating the water of the electrolyte and concentrating the acid. Under the worst conditions of battery neglect, strong acid together with any high internal heat developed due to high charge rates, chars the separators, disintegrates the positive grids and badly sulfates the negative plate material.

Without question, more batteries are brought to an untimely end through conditions of overcharge than from any other cause. From this there seems to be slight hope of relief. One effective measure of protection against the effects of overcharge and concentration of acid, through neglect to water the battery, is to be had in providing a large water space above the plates. It has been found possible to increase the water space above the separators so that there is four times as much liquid above the separators as is to be had in the usual standard construction. This has been accomplished without reducing the battery capacity and without lowering the height of the plates, separators or bridges, and also without altering the overall dimensions of the battery.

As a result of this design which provides for a larger volume and higher level of slightly lower gravity electrolyte, it is possible for the battery to be overcharged

(*Continued on page 37*)

and safely neglected for much longer periods of time—months at a time instead of weeks, as has been the custom. It therefore has become possible, except in unusual cases, to suggest that the average car owner water this new type of battery with the seasons—in Spring, Summer, Fall and Winter. Barring wilful abuse, whatever the owner's present battery watering habits are, he is now permitted a four-fold measure of neglect.

(EDITOR'S NOTE: *Mr. Wilson, the author of the foregoing, is chief chemist of the Prest-O-Lite Storage Battery Company, Indianapolis, Ind. The above remarks are taken from a paper read before the recent convention of the National Battery Manufacturers' Association.*)

Are Stock Records Necessary?

(*Continued from page* 10)

as to parts that become obsolete, and not allow changes to be made without calling it to the operator's attention.

For instance, we might call up one morning and ask for a certain part, such as a clutch disc, only to hear: "Oh, that's being discontinued entirely. We have a new clutch disc for that model, part number so-and-so." Changes of this kind often mean as much as $12,000 per year to the fleet operator. We find cases of this kind to be true all the way down the line. There seems to be a lack of the proper dissemination of information on parts that have become obsolete as a result of progress that has been made in the industry.

We, as fleet operators, really feel that there is a laxity somewhere, particularly when we bear in mind, and notwithstanding the increased efficiency effected by parts suppliers in supplying parts to the fleet operator, in comparison to the service rendered but a few years ago.

Building an Ice-Cream Truck Body

(*Continued from page* 24)

Another firm manufacturing its own truck bodies has found that, by using aluminum, dead weight can be converted into 20 per cent more payload on each truck. This firm's introduction to the value of oxy-acetylene welding for aluminum fabrication occurred in an interesting way. The firm had a rush order for an aluminum truck. During its construction, one of the aluminum roof sheets fractured. Due to lack of time, it was impossible to secure another. A welding service operator, learning of the condition, suggested that the fractured sheet be oxwelded. This was done and the sheet was as good as new.

The builders of the truck were so impressed by this performance of oxwelding, which saved several days' delay, that they have extended its use to the construction of many parts of the body, such as the tailpiece, the rear and side doors, and the tool box; and they plan eventually to fabricate entire bodies by oxwelding.

Servicing Timken-Hydraulic Brakes

(*Continued from page* 34)

plug "HD" is replaced. The bleeding of the line is performed individually at each operating cylinder.

With this bleeding operation once correctly completed, rebleeding is necessary only when some part of the hydraulic system is disconnected.

When mounting Timken Duplex and Duplex-Hydraulic Brakes on Timken Axles, every precaution is taken to prevent grease or oil from getting on the brake lining or in the brake drum. Naturally such grease or oil will affect the coefficient of friction of the brake lining and cause unequal braking. For this reason, oil slingers and oil catchers are incorporated whereby any leaky grease or oil is thrown out between the drum and wheel.

QUALITY GASKETS

for every Car, Truck, or Bus in your Fleet

Every Vellumoid gasket—whether ready-cut or cut from the sheet—is a quality product, made to stand the gaff of the hardest service.

Vellumoid is a solid, compressible sheet, over gauge in thickness. It does not peel, tear, crack or break, either in stock or in use. The flanges bite into it, making tight connections which ***stay tight*** and protect your work.

Stock Vellumoid ready-cut gaskets for the cars, trucks or busses in your fleet and Sheet Vellumoid from which you can quickly cut or tap out any gaskets desired.

Ask Your Jobber

VELLUMOID

THE REAL REPLACEMENT GASKET MATERIAL

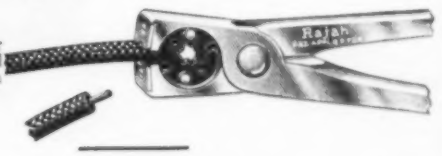
For the Oil, Gasoline, and Water Connections

The Vellumoid Co., Worcester, Mass.

You Save Money

on rewiring jobs by using the new **Rajah** Hand Crimping **Tool**

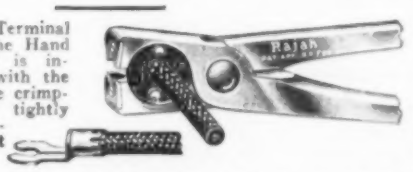
This new tool crimps Rajah Terminals to ignition cable without the use of solder or any other tool. Note the simplicity of using it.



(Right) The cutter on end of Tool will remove just enough insulation.

(Left) Bend the exposed wire strands over end of Cable, then insert into ferrule of Terminal.

(Right) Now crimp Terminal to Cable by using the Hand Tool—The Terminal is inserted in the Tool with the ferrule flush with the crimping jaws—Compress tightly and you have a positive and **permanent** connection.



Tool with neat metal box containing 250 distributor terminals and 253 assorted spark plug terminals, $11.20. Tool alone $4.00.

THE RAJAH COMPANY, Bloomfield, N. J.

Send this coupon with your letterhead or business card for our special offer. You are sure to receive an unusual present. No obligation.

Name .....

Address .....

☐ Proprietor ☐ Service Manager ☐ Shop Foreman ☐ Mechanic

Solving *the* Trailer Brake Problem

Four Brake Makers and One Axle Company Join Hands in Move to Save Thousands of Trailers from Scrap Heap

WITH the demand being constantly made for greater speed and bigger loads for motor freight transport units, the need for maximum safety has been pointedly emphasized by passage of laws in various states.

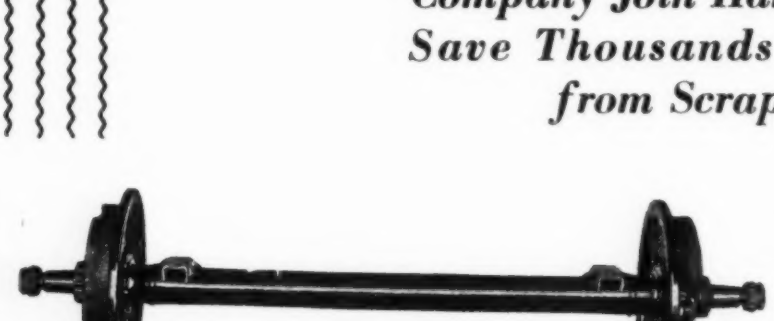


Figure 1—New Timken trailer axle with Lockheed hydraulic brake, ventilated type, (left) and Bendix duo-servo brake, (right).

Brakes are one of the most important factors if present fast road schedules are to be maintained or increased. Legislators and insurance companies recognize this, and year after year more laws are passed regulating brake equipment.

Recently the brakeless trailer—of which thousands are still in service—has become the target of lawmakers. During the present year, countless numbers of these vehicles will be relegated to the scrap heap unless they are equipped with efficient braking systems.

Recognizing this need, four brake manufacturers and an axle company have joined their resources and experience to devise a method of saving the thousands of trailers which are in good condition, except that they have no brakes.

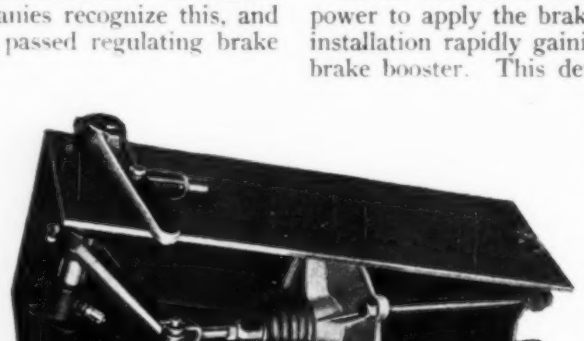


Figure 2—B-K vacuum brake booster cylinder trailer installation at "on" position.

These five concerns are the Bendix Brake Company, the Bragg-Kliesrath Corporation, the Hydraulic Brake Company, the Bendix-Westinghouse Automotive Air Brake Company, and the Timken-Detroit Axle Company.

A trailer axle has recently been developed by Timken which is being equipped with any desired type of Bendix, Hydraulic or Timken brake. Power application can be either by B-K vacuum brake boosters or by Bendix-Westinghouse air brakes and controls.

By substituting the newly developed trailer axle for the brakeless axle with which the trailer was originally equipped, it is now possible to convert the vehicle into a transport unit that will answer every legal requirement.

Trailers are primarily a power brake job and braking systems are essentially an axle job. The axle must be designed to withstand braking torque and the brakes should be designed for the axle. For these reasons it is impractical to equip brakeless axles now in service with brakes and expect the brakes to function efficiently

Either vacuum or compressed air can be used as the power to apply the brakes on the new axle. A vacuum installation rapidly gaining in favor is the B-K vacuum brake booster. This device utilizes the vacuum created by waste power from the engine's intake manifold and applies this power to the brakes with the minimum of effort on the driver's part. One-third the foot pressure on the brake pedal creates twice as much braking power at the wheels than if the brake booster was not used.

This booster can be installed on any brake system and tests have shown it makes a practical installation with the new trailer axle and whatever type of brake is used. It is extremely simple, consisting merely of an operating valve controlled by the brake pedal and a vacuum cylinder in which a piston moves.

Brake boosters on both tractor and trailers can be operated by an external valve in the brake pedal line so that power braking can be obtained on all units in the tractor-trailer train by application of the tractor brake pedal.

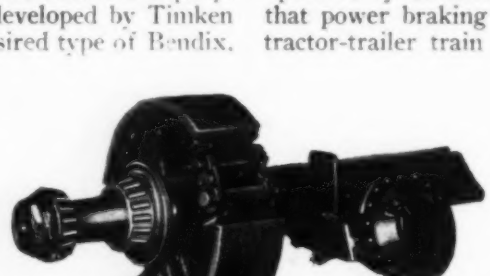


Figure 3 — Bendix-Westinghouse air brake trailer unit, showing air chamber and slack adjusters.

In order to provide instantaneous and simultaneous braking power on all units of a trailer train, the B-K brake booster is equipped with a relay valve. This reduces to a minimum the amount of time elapsing between the moment the brakes take hold and the moment the driver depresses his brake pedal. Until development of this relay valve, the time problem was

(Please turn to page 39)

a serious factor because two or three seconds might be required for the air to pass through the air lines to the trailer brakes and the train might travel 200 feet or more before the brakes took hold.

With the air brake installation on tractors and trailers the brakes are applied by compressed air acting in brake chambers and are controlled by a foot or lever-operated valve. An air compressor is operated by the crankshaft of the engine, or one of its auxiliary shafts, and the air is stored in a reservoir. Pressure on the brake valve with the foot or movement of a lever directs the flow of air from the reservoir to a brake chamber on each wheel where the air is converted into mechanical energy to apply the brakes.

Hydraulic brakes operate on the principle that pressure applied to a fluid is transmitted equally to all surfaces. When the brake pedal is depressed it moves a piston in a master cylinder, displacing the brake fluid contained therein and forces it through flexible tubing into cylinders at the wheels. Pistons in these cylinders are connected to the brake shoe ends. Flexibility of this system likewise makes it ideal for use on the new trailer axle.

Space here does not permit a detailed description of the new trailer axles, but if you are interested the Editor will be glad to see that a complete set of engineering bulletins on this subject shall be forwarded to you at once, without the slightest obligation on your part. Address all inquiries to the Editor, and simply ask for "new data on trailer axles and brakes."

Good Maintenance Means Safety

(*Continued from page* 18)

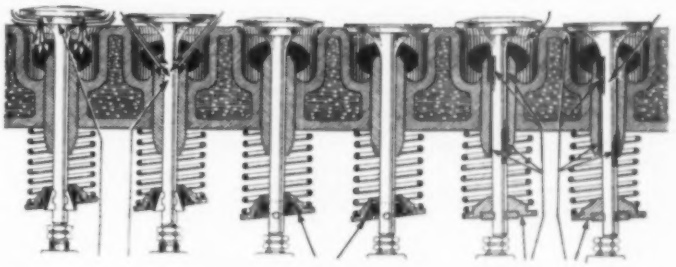
more than these drivers themselves. They are cool and analytical during all stages of the race. They know every feature and part of their respective cars, and will only enter the race when they and their mechanics know, absolutely, that the car is right. Practically the last thing they do before starting is to have the wheel alignment and running gear of their cars checked by experts, on special wheel aligning machinery, which has been installed at the race track only the last couple of years.

I was told that in 1930 in the city of Evanston an extensive check-up was made on motor vehicles and it was found that 70 out of every 100 cars—think of it—seven out of ten or 70 per cent, had defective running gear; in fact I could go so far as to say they had defective steering mechanism. I think you will agree that a condition like this that applies to one city will be found to be very much universal; and when we think in terms of safety, I know you are with me when I say this is a serious, a very serious situation.

In order to get some definite facts concerning accidents which resulted from defective steering mechanism, I visited our local Police Department, and here I might state that the police of Grand Rapids are noted throughout the country for the statistics they keep in connection with accidents. But they were not able to give me any information at all, other than the number of motor cars involved in accidents that had defective brakes. I therefore went to the representative of the Bear Manufacturing Co., who is conducting a school on wheel alignment in Grand Rapids. I asked him how many cars came into his shop for adjustment of the steering assembly, that had featured in accidents due to the mis-alignment of the wheels; and I asked him if he would give me the data on the next 100 cars that came to him for a check-up. Would you believe it, when he turned this report over to me we found that 19 out of those 100 cars had been involved in accidents, which resulted in a total cost of many hundreds of dollars for repair bills, hospital expenses and other unnecessary costs and—*one*

(*Please turn to page* 41)

UNIFORMITY MULTIPLIES DURABILITY, EFFICIENCY *and* ECONOMY



With our flat seat valve the heat is deflected from the stem and guide, whereas with taper seat valves the heat is directed to the stem and guide, causing valves to stick, stay open and warp; expensive replacement results.

Our valve spring tension equalizer provides the all-important uniform contact and heat dissipation necessary in order to eliminate excessive wear and obtain and maintain maximum economical motor performance and maintenance.

The ordinary spring retainer is held rigid on the lock at right angle with the valve stem. Due to the always existent unequal spring tension, uniform contact is impossible and excessive wear at the above arrow indicated points, results.

BOYLE VALVE CO., 5820 So. Ada St., Chicago

Please send free literature on valves and spring tension equalizer.

BOYLE MOTOR PRODUCTS

Name .....

Street .....

City ..... State .....

WELCH Pac-less PUMPS

CAN'T LEAK

SLICE your high maintenance costs. Why lose costly anti-freeze fluids by pump leakage? Why constantly re-pack pumps? Welch Pac-less pumps stop both FOR GOOD! Positive, constant seal under toughest usage. Installation is simple and quick.

We have a plan whereby it costs nothing to test one of these pumps to prove its merits to yourself.

Fully guaranteed. Let us send you literature and full details about it. Write

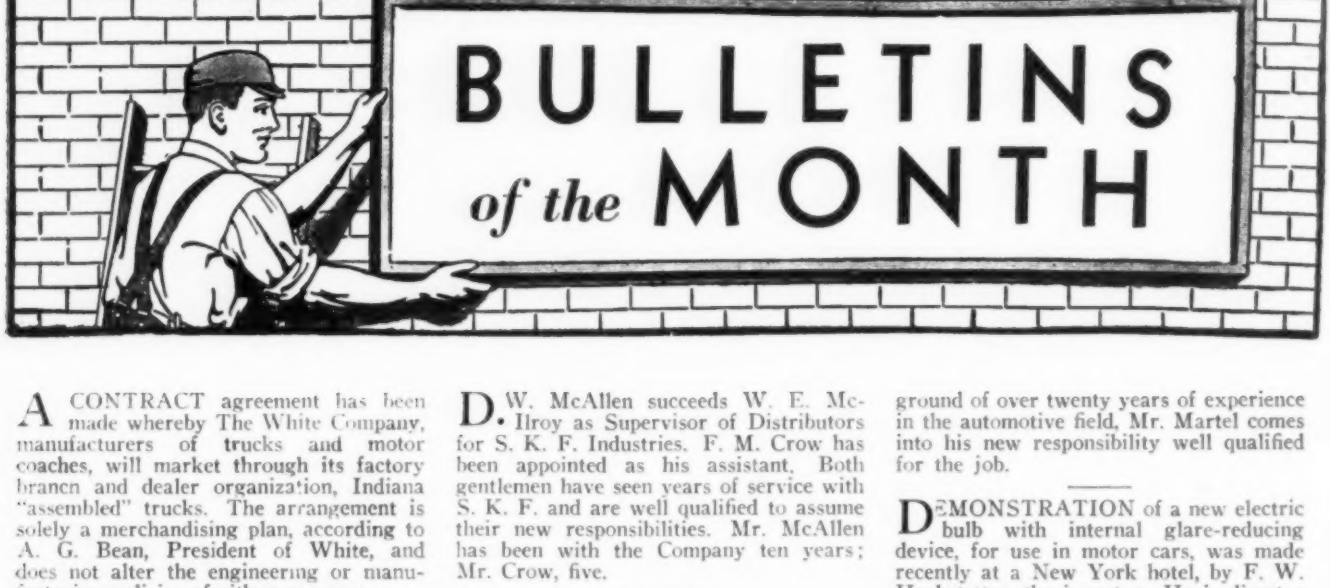
The WELCH PAC-LESS PUMP CO.

1981 W. 96th St. Cleveland, Ohio

Please send me full details of the new Welch profit plan for Fleet Owners and operators.

Name .....

Address .....



A CONTRACT agreement has been made whereby The White Company, manufacturers of trucks and motor coaches, will market through its factory branch and dealer organization, Indiana "assembled" trucks. The arrangement is solely a merchandising plan, according to A. G. Bean, President of White, and does not alter the engineering or manufacturing policies of either company.

RECENTLY, Smith & Gregory took over the service station of the Bragg-Kliesrath Corporation in Long Island City, N. Y. This is said to be the largest service station in New York City for the installation, repair and service of B-K vacuum brakes, Bendix-Westinghouse air brakes, Bendix clutch controls and Timken trailer axles, etc.

THE sharp increase in the demand for trucks is a decided indication of a general business improvement, L. B. Manning, vice-president of the Cord Corporation, pointed out recently, in announcing that several truck manufacturers had increased their commitments for Lycoming truck engines within a recent period.

CREATION of a fleet sales division is announced by Aluminum Industries, Cincinnati, Ohio, according to W. E. McIlroy, director of distribution. The new division will be in charge of W. H. Washburne, and will cooperate with Permite jobbers in handling the sale of their products.

REGISTRATIONS of Studebaker trucks from statistics now available show an increase of 1,974 units in 1931 over 1930, according to A. R. Erskine, President of The Studebaker Corporation. Reports from Studebaker truck dealers indicate that 1932 will show a substantial increase in registrations over 1931.

ELECTION of W. A. Olen, president and general manager of the Four Wheel Drive Auto Company, Clintonville, Wis., to the board of directors of the manufacturers' division of the American Road Builders' Association, is announced. The election took place in Detroit at the annual meeting of the Association.

GRAMM MOTORS, INC., Delphos, Ohio, have recently announced an extra set of equipment known as "Gramm Comfort Equipment." This consists of a hot water heater, safety laminated glass, cigar lighter, windshield defroster and electric clock, which can be furnished as standard equipment at extra cost.

D. W. McAllen succeeds W. E. McIlroy as Supervisor of Distributors for S. K. F. Industries. F. M. Crow has been appointed as his assistant. Both gentlemen have seen years of service with S. K. F. and are well qualified to assume their new responsibilities. Mr. McAllen has been with the Company ten years; Mr. Crow, five.

ENGINEERING bulletins and other literature describing trailer axles and power braking systems are offered by The Timken-Detroit Axle Company, Detroit, Mich. They contain lots of good dope on modernizing trailers by the adoption of good braking systems, and were prepared in collaboration with four other makers of braking systems and boosters. The Editor will see that you are supplied with a free copy. Ask for same.

TEN Dodge standard and heavy-duty trucks were recently purchased by the U. S. Navy Department. They range in capacity from 1½-tons to 3-tons and were shipped to the Panama Canal Zone and other Pacific territorial possessions. They are to be used in construction and maintenance work.

THE Rockford Northwestern Malleable Corporation and the Gunite Corporation, both of Rockford, Ill., have recently consolidated under the name of the Gunite Foundries Corporation, it is announced by Duncan P. Forbes, president and general manager of the new concern. Brake drums, clutch plates, connecting rods and other products will be manufactured.

"WE finished the year 1931 and are entering the year 1932 with the largest volume of commercial orders on our books in the history of the company," says W. A. Olen, president and general manager of the Four-Wheel Drive Auto Company, Clintonville, Wis. Full capacity operation of the Company's various departments is also announced.

FRUEHAUF TRAILER has moved its Cleveland branch to new quarters on Superior Avenue, under the management of F. L. Tully. This Company's Indianapolis branch has also recently been removed to more spacious quarters on North Capital Avenue. C. J. Kloske, St. Louis distributor, also has established showrooms at 725 Chouteau Avenue for the exhibition of Fruehauf models.

W. S. MARTEL has recently been appointed manager of the Automotive Replacement Division of the Dayton Rubber Mfg. Co., Dayton, succeeding A. W. Reith, deceased. With a background of over twenty years of experience in the automotive field, Mr. Martel comes into his new responsibility well qualified for the job.

DEMONSTRATION of a new electric bulb with internal glare-reducing device, for use in motor cars, was made recently at a New York hotel, by F. W. Hochstetter, the inventor. He is director of research of the laboratories in Pittsburgh which bear his name and was formerly associated with Edison and Steinmetz in research work.

DIAMOND T truck sales in 1931 exceeded the previous year's by a slight margin, it was announced recently by C. A. Tilt, president of the Diamond T. Motor Car Company. Especially conspicuous in this showing, he adds, was the record made in the final seven months, during which a 32 per cent increase was scored over the corresponding period of 1930.

ACQUISITION of the Charter Starter Drive was announced recently by the Burgess-Norton Mfg. Co., Geneva, Ill. This is a new type of starter device that is said to be practically unbreakable, non-sticking and simple. There are only three major parts and a spring which make up the drive. Full details will appear in an early issue of this publication.

FIFTY employees of the R. A. Davis organization, engaged in the contracting, trucking, ice and coal business, of Wilkes-Barre, Pa., have recently been covered with life insurance through the acquisition of a group policy by that concern. The premium payments will be shared by the employees and the employing company.

AFTER eight years' association with prominent agencies in the field of automotive advertising and merchandising, Thomas F. Lannin has recently organized his own agency to specialize in this particular field. Mr. Lannin is well known for his intimate knowledge of jobbing and retailing trade conditions. The name and address: Thos. F. Lannin, Advertising, 2326 S. Michigan Ave., Chicago.

THREE new distributors of Cleco Air Springs have been named recently. They are: General Brake Service, 2727 Locust St., St. Louis, Mo.; Wm. A. Clemens, 7929 Yale St., Chicago, Ill.; A. Norman Graf, 1303 Liberty Bank Bldg., Buffalo, N. Y., according to F. H. Burr, director of the Automotive Division of Cleveland Pneumatic Tool Company, manufacturers.

Good Maintenance Means Safety

(*Continued from page 39*)

death. Each of the accidents was the direct result of defective steering mechanism and running gear.

Let us review the one tragic fatality, which tells a tragic story of neglect. The car had been checked and found to have a bent steering arm and unbalanced wheels. The owner was warned that the high speed shimmy in his car was unusually severe on account of the double defect. But the owner was in too big a hurry to have the trouble corrected then and said he would come in later. A few days afterward, however, while he was trying to pass another vehicle, his car broke into a shimmy and rolled over into the ditch, killing his father who was riding on the rear seat.

The other 18 cases carry similar lessons, although in most of them the results were less serious. Some of the drivers did not realize the hazards, while others ignored warnings.

In conclusion, I just want to impress on you strongly that if you keep the thought of SAFETY foremost in mind where your car or truck maintenance is concerned, you will naturally create an investment that will pay you a high rate of interest, *and save many lives!*

(Editor's Note: Mr. Oldham's remarks as presented in this article, are abstracted from an extensive paper read before the recent Annual National Safety Congress.)

Minimizing Icy Pavement Skids

(*Continued from page 20*)

per sq. yd. of pavement surface.

Removal of the ice from the pavement surface by the direct application of calcium chloride is not recommended for general practice. However, where this is deemed necessary the resulting slush should be removed from the surface of the pavement,

The Highway Research Board at Washington has just issued a set of specifications for ice control work which should result in a saving of lives and property in all northern states. The greatest dangers on curves or stop light corners can be corrected in a few minutes by the new method. No doubt hilly cities and in fact all counties having steep grades, will make use of this process which will be also recommended by insurance companies and similar interested agencies. For full particulars, address: Highway Research Board, Washington, D. C.

Organized Safety Effort Pays

DURING the period from 1927 to June 30, 1931, the number of trucks involved in fatal accidents decreased 8 per cent, the number of buses involved decreased 20 per cent and the number of taxicabs involved dropped 65 per cent. The average decrease among commercial vehicles so involved amounted to 31 per cent. The figures were compiled by the National Safety Council.

In decided contrast is the tragic experience of private car fatalities. During this same four and one-half year period the number of such cars involved in fatal accidents increased 59 per cent!

It is apparent that the uncontrolled private driver is continuing to maim and kill on an unprecedented scale and that the peak apparently has not yet been reached.

It is also apparent that the fruits of a continuous campaign for safety such as is carried on by commercial vehicle operators, backed by disciplinary control, is reaping a rich harvest in human conservation. The comparison speaks for itself; it leaves no doubt as to the value of organized safety effort.

AUBURN

~ 1481 ~

Spark Plugs

Reduce your operating costs per truck mile

Sold to Bus Companies, Public Utility Companies, Oil Companies, Packing Houses, Railroads, Trucking Companies, and other lines. Names of these companies will be sent on request.

Our "H" Series of Heavy Duty "1481" spark plugs are giving extraordinary service and satisfaction under the most extreme conditions. Try these in motors where electrodes in other plugs are burning up and insulators blistering or breaking. Auburn "H" spark plugs will stand this rigorous test day in and day out without any trouble, always giving the very limit of service.

Are constructed of selected materials. Made upon honor, they are thoroughly tested to assure the maximum service. Efficient large scale production enables them to be sold at prices which are more than reasonable.

All our spark plugs are made upon honor and we guarantee to replace, FREE OF CHARGE, any part found defective. You are the judge.

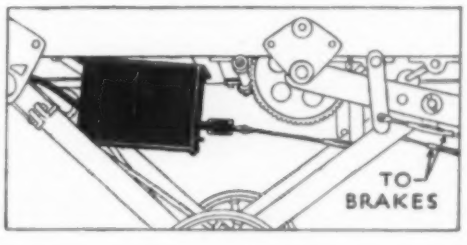
Write for literature and prices

New York Mica and Mfg. Co.

AUBURN, N. Y.

LITTLE GIANT
BRAKE BOOSTER

STOPS LIKE LIGHTNING



From 40 Miles Per Hour to Dead Stop in 37 Feet

The Little Giant (Electric Control) Brake Booster acts almost instantly either in applying or releasing brakes. Cannot freeze up in zero weather. Made for trailer, train or trailers, heavy trucks, busses, etc. Operates with any type brake except electrics. No upkeep cost, takes less current from battery than blowing horn. No expert attention needed. Has three times the necessary draw bar pull. A GUARANTEED LITTLE GIANT PRODUCT. Low in cost.

LITTLE GIANT PRODUCTS, Inc.

140 Caroline St. Peoria, Ill.

Motor Fuel Keeps Body Cool

New Motor Gasoline Called "Petrogas" is First Run Through Truck Body, Absorbing Heat, Before Being Fed to Carburetor; Western Operator is First to Adopt It.

REFRIGERATION without the use of mechanical contrivances or chemicals other than the actual fuel to be consumed by the truck motor itself, is promised (and actually in use) by means of the Shell Petrogas system, recently announced by Shell Oil Company. The system was developed by Messrs. D. W. Davisson, manager of the automotive department, and F. G. Welke, experimental engineer of the Shell Oil Company.

The first installation was made on a meat truck of Tiedemann & Harris, Inc., of San Francisco, distributors of Sinclair's Fidelity hams and bacon, who co-operated with the Shell Company in making the installation.

The accompanying photograph shows the meat truck equipped with a Petrogas fuel and refrigeration system. The body of the truck is divided in two compartments, one approximately twice the size of the other. The interior temperature is reduced from 60° F. to 35° F. in a run of one hour, it is claimed.

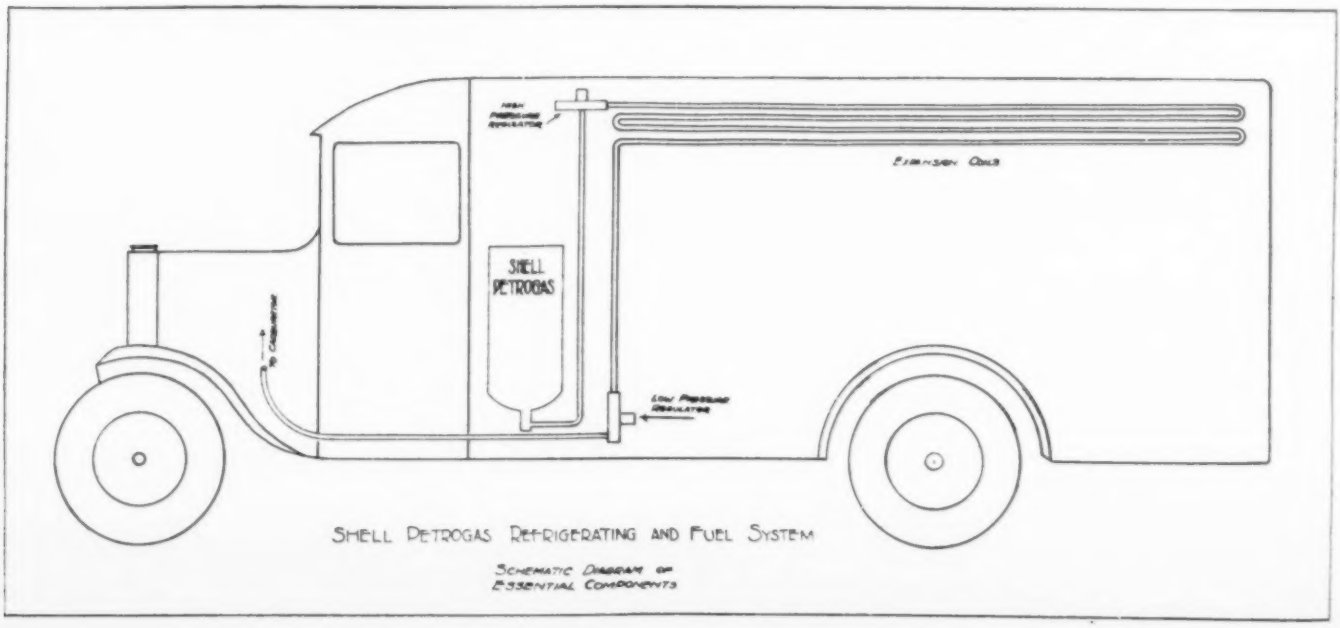
The drawing which also accompanies this article gives a rough idea of how the fuel first travels through the coils in the truck body and then passes through to the engine.

Cooling is accomplished without the use of ice, carbon dioxide or mechanical means. The operating cost of maintaining a low temperature within the truck body has been eliminated, and as a result it is expected that an entirely new field of automotive transportation will be opened. The transportation of all perishable products which require a low temperature when in transit can now be done more economically than before with motor trucks. Temperatures as low as minus 25° F. (approximately) are possible. The temperature to be maintained depends of course upon the many variable factors common to refrigeration and also the rate of fuel consumption by the motor.

Shell Petrogas, the new fuel which makes this economical refrigeration possible, has been under development for a considerable length of time. It is claimed to be a perfect fuel from the anti-knock standpoint and complete absence of crankcase dilution. Shell engineers state that it will operate successfully, unadulterated, in high compression motors, without detonation. The value of the claim of complete absence of crankcase dilution is well known to those familiar with cylinder wear in gasoline engines. Carbon troubles are also largely eliminated, according to the Shell people.

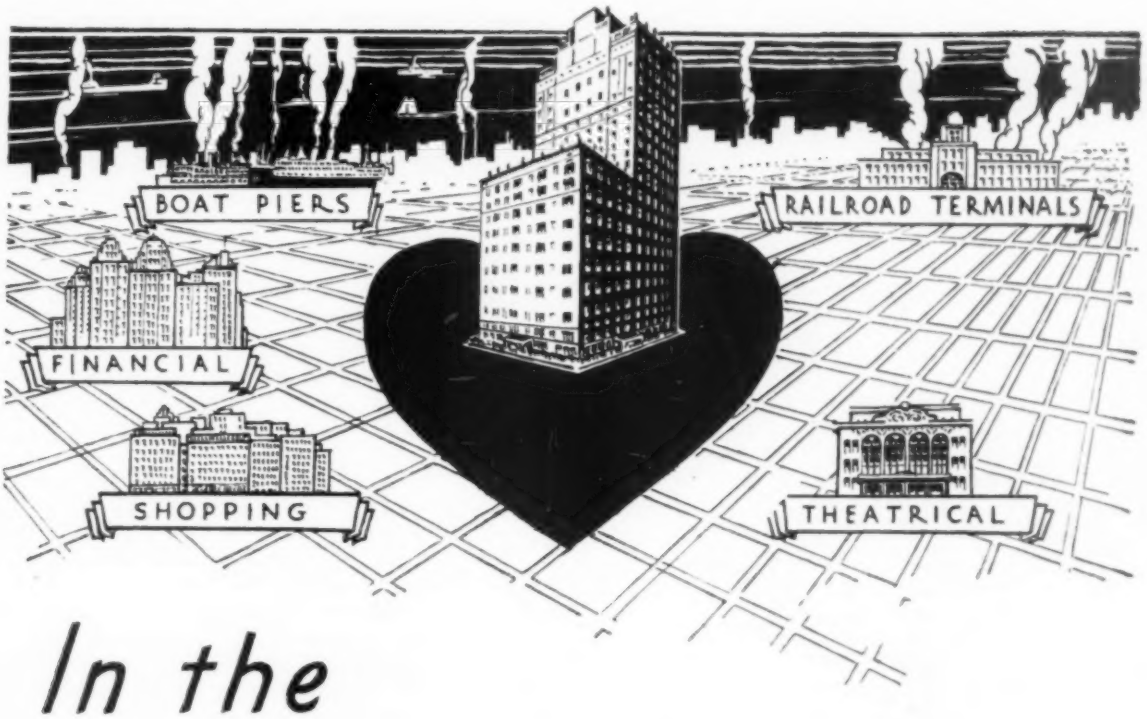
The theory of obtaining the refrigerating effect by the use of Shell Petrogas is quite simple and can be explained in brief by reference to the accompanying schematic diagram. A quantity of Shell Petrogas is held under pressure in liquefied form in a storage tank at atmospheric temperature. A fuel line leads from the tank to a high pressure regulator through which the fuel flows in liquid form. The high pressure regulator is set so as to reduce the pressure to 5 lbs. per square inch (approximately), and allow the fuel to pass into

(Please turn to page following)



SHELL PETROGAS REFRIGERATING AND FUEL SYSTEM

SCHEMATIC DIAGRAM OF ESSENTIAL COMPONENTS



In the HEART *of* DETROIT

HOTEL FORT SHELBY is located in the center of "downtown" Detroit. It is just around the corner from the Union Station, serving the Pere Marquette, the Wabash, the Pennsylvania and Baltimore and Ohio Railroads. No other large Detroit hotel is so near the Michigan Central Terminal, the principal airports, or steamship piers. ¶ The shopping, theatre, financial, insurance and wholesale districts are practically at its door. Hotel Fort Shelby is known the world over for its luxurious, commodious rooms . . . its inviting lobby . . . its tempting, delicious food . . . its attractive rates and informal hospitality. ¶ 900 units . . . all equipped with servidor and private bath. Rooms as low as $3.00 . . . suites $10.00 and upwards.

Motorists are relieved of their automobiles at the door without service charge. Write for free road map, and your copy of "Aglow with Friendliness," our unique and fascinating magazine.

HOTEL Fort Shelby

"AGLOW WITH FRIENDLINESS"

E. J. BRADWELL, *Manager*

DETROIT

NEW MOTOR FUEL DOES DOUBLE DUTY *(Continued)*

a series of expansion coils in the interior of the body to be cooled.

The fuel then evaporates to a gaseous form in these coils, which progress requires the addition of heat. This heat is absorbed from the interior of the truck and lowers the temperature, accomplishing the refrigerating effect. The gasified fuel is then led to the low pressure regulator and the pressure reduced to the vacuum which exists in the intake manifold of the motor or venturi tube of the carburetor. The fuel is then led to the carburetor and consumed by the motor.

If the vacuum ceases to exist in the venturi tube or intake manifold (i. e. when the motor is stopped) the low pressure regulator will close and shut off the flow of fuel.

It is not necessary to explain that a vacuum always exists in the throat of the venturi tube of the carburetor or the intake manifold while the motor is running, and this vacuum immediately disappears when the motor is stopped. Thus it is seen that the fuel system is fully as automatic as the conventional gasoline system.

On account of the novel nature of the idea, it was necessary to develop a number of devices in order to adapt the fuel for automotive use. A Shell Petrogas fuel and refrigerating system can now be installed on a truck without removing the gasoline system or making any alterations other than the addition of a gaseous fuel adapter to any standard carburetor. This adapter has also been developed by Messrs. Davisson and Welke after many experiments, and when a motor is so equipped it can be operated on gasoline or Petrogas alternately by shutting off the supply of one, and turning on the supply of the other.

The advantages of utilizing the cooling qualities of this most ideal fuel are widespread. In addition to cooling refrigerated trucks, Petrogas could be used by motor buses in hot climates as an excellent fuel and at the same time lower the temperature inside the car to a more comfortable level without additional operating costs.

The invention is primarily intended for trucks carrying perishable products. "If liquefied gas were used on pleasure cars, a special warming device would be necessary," stated Inventor Davisson.

One of the trucks equipped with the motor-fuel refrigerating system. The tanks can be seen in the body. There is no waste—all of the fuel is consumed by the motor, none being used by the refrigerating system.

A test run has just been completed with a truck equipped with a 16 ft. by 8 ft. refrigerator body carrying three tons of butter, and the charts indicated that the temperature was maintained at approximately 30°.

The results of these tests have been such that the inventors are very enthusiastic over the device and feel that the field for its use is practically unlimited.

Mileage costs on fuel have been found to be approximately the same as that of gasoline, but the cost of equipping a truck with a cooling unit is very much less because there is no complicated mechanical equipment.

There are some refinements still to be made in regard to regulating temperature, etc., and there are also many other problems to be solved in connection with distribution and manufacture before the device or fuel will actually go on the market, but it has been proven that it has progressed far beyond the point of being considered experimental.

Fleet operators who may be interested in this new development are invited to write for full details. Inquiries addressed to the Editor, will be placed into the proper hands, without obligation on your part.

Business Steps Briskly Ahead

TRIPLING of last year's record business is the goal set for this year by Ellsworth R. Boeck, president of the Truck Equipment Co., Inc., Buffalo, N. Y.

"Within the next 30 days a 100 per cent increase in shop employment will be made," Mr. Boeck recently said. "With three branch plants already established at strategic points in the United States during the last six months," Mr. Boeck went on to say "plans and negotiations are being made to acquire or build three more plants in the national field."

Swinging into production of a combination "third-axle and gravity spring suspension system," recently described in this publication, "the company plans immediate employment for at least a 100 per cent increase in shop workers. Output of the third-axle and gravity spring combination was made possible recently through the successful completion of a deal with the Fager Hydraulic Hoist & Body Co., of Los Angeles.

Exclusive rights east of the Rocky Mountains of the Fager patents on the new third-axle were acquired by the Buffalo firm. Another factor that promises success for the ambitious goal set for 1932 is the fact that 28 state legislatures have passed regulations permitting additional carrying capacity for third axle equipped trucks. Anticipating increased orders, the Truck Equipment Co., Inc., plans to establish 20 more distributors in various parts of the country.

D. W. McAllen, who has been with S K F Industries, Inc., for the past ten years, has succeeded W. E. McIlroy as Supervisor of Distributors, and F. M. Crow has been appointed Assistant Supervisor of Distributors.

During a decade of service with S K F, Mr. McAllen has had a broad experience in the jobber field and is well qualified to assume his new responsibilities.

In the five years that Mr. Crow has been connected with S K F, he has devoted his entire time along the lines of jobber cooperation and is now ready to render even greater service in his new position.

TROUBLE SHOOTER

(You Ask 'Em — We Answer 'Em)

A department, devoted to correspondence from readers of FLEET OWNER. Any questions having to do with automotive service will be answered in this department. All properly signed inquiries will be replied to by mail and such of them as are believed to be of possible interest to other readers will be published in these columns.

Aluminum Pistons O. K.

Question: I am considering the installation of aluminum pistons and connecting rods in a light truck engine. Would these parts have any appreciable effect on the functioning of the motor and would I be reasonably assured of an improvement in motor performance, provided that the job was done correctly?—S. J., Grafton, Wis.

Answer: It is generally conceded that the lightening of reciprocating parts such as pistons and connecting rods, by the use of aluminum alloys or special lightweight iron pistons, will improve the performance of any motor by providing less vibration, faster acceleration and more pep in general.

It is important, however, that the aluminum pistons be fitted with the proper clearance, that the rings have the proper clearance in the ring grooves, that the proper oil relief holes be provided and that your cylinder bores be reasonably true.

In order that you may assure yourself of the correctness of these factors, we are sending you under separate cover a complimentary Shop Chart which gives detailed, illustrated instructions for fitting pistons, rings, bearings, valves, guides and other motor parts. It also contains a handy decimal equivalent chart. When doing your job we would suggest that you let the chart be your guide.

(Editor's Note: Should other readers desire free copies of the chart that was sent to Mr. J., these can be obtained without obligation by writing to the Editor; on your letter-head, and asking for the Shop Chart. This is something that is really worth hanging on your wall, as it will be found useful for many varieties of jobs. As our supply of these charts is limited, the copies will be sent in the order that the requests are received.)

Adjusting After Relining

Question: We have a Dodge truck equipped with hydraulic brakes, on which the brake drums were reground and new lining applied to the shoes. We are somewhat puzzled as to the proper adjustment of the brake shoes on this model, as the brake shoe anchor pins are of the eccentric type. Can you give us any instructions as to the proper adjustment of the shoes?—W. H. H., Jacksonville, Fla.

Answer: After installing new shoes or facings it will be necessary to adjust the anchor pins, which are eccentric, so that the proper clearance between the lining and drum will be assured.

To do this it will be necessary to have a special precision tool so that adjustments can be made and clearances checked accurately. The anchor pins and cam adjustments should be so set that the clearance between the bottom of the lining and the drum is .006"; and the clearance at the top .012". We presume you are familiar with the balance of the instructions applying to adjustment of hydraulic brakes.

Lubrication's Just This:

LUBRICATION results from two factors, cohesion and adhesion, both of which are component properties of oil, the Pennsylvania Grade Crude Oil Association explains, pointing out that many people are not familiar with the real function of a lubricating oil.

"A lubricating oil must possess cohesion, or the ability of oil particles to stick together, and adhesion, their ability to cling to surfaces," these authorities point out. "If you dip a tin plate in oil and take it out, the entire surface is covered with an oily film. Cohesion keeps the film flat; adhesion keeps it on the plate.

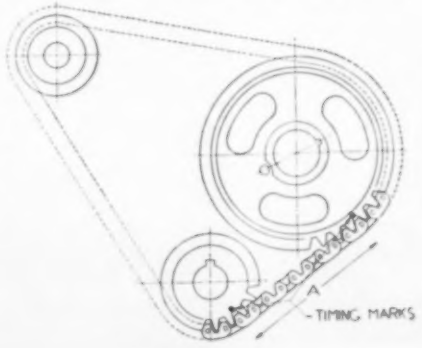
Thus, when you put oil between two metal surfaces one film forms on one surface and one on the other. When one surface moves, one film glides over the other and the metal surfaces do not touch. This is lubrication. And this is what reduces wear on engines and moving parts."

How to Time Continentals

Question: Most of our fleet of trucks are equipped with Continental engines. We often have difficulty in timing the valves and ignition. Can you give me any general information on these, particularly as to how to check for proper application of the timing chain.—Telephone Inquiry.

Answer: On Continental engines, there are invariably to be found fly-wheel markings, such as DC 1-6, Ign., etc. If you can find these you should have no difficulty in adjusting the ignition and valves.

The timing chains are applied on most Continental engines after the manner shown in the attached sketch. The number of links or chain teeth that go between the sprocket marks is usually stamped or cast into the timing chain housing or cover. When the cover is off, look for the number of links which will be marked somewhere, and then check this against the actual position of the marks on the sprockets.



Mr. G., You Flatter Us

Question: We have a ton-and-a-half Sterling truck that breaks rear axles pretty often. We've only had the truck two years and I think we've put in about 7 or 8 axles, usually on the same wheel; in fact only once did the opposite one break.

The Sterling people tell us they don't know what is wrong. It surely isn't from overloading, as we have often tried keeping it within certain limits, which is not a hard thing to do, according to the way loads run nowadays.

The axles always break at the same place—just at the end, near the nut that holds the wheel on; just enough stock to fill the nut that holds the wheel on, and always in the same place. We would appreciate your advice on this, as it is quite costly, especially if the truck drops down on the brake bands.—W. G., South Milwaukee, Wis.

Answer: You flatter us, Mr. G. Since the Sterling people can't advise you as to the cause of your trouble, we sincerely appreciate the confidence you have placed in us. The best we can do is offer a few suggestions, which you may or may not have had before.

We note that the axle always breaks at the end near the nut, and it is quite possible (if this is a semi-floating axle) that some "strong-arm" in your shop is putting excessive strain, when tightening up the nut, sufficient to cause a fracture in the shaft between the hub and nut. Care should be taken when tightening up. Do not use a 3-foot wrench on this nut.

It is also quite possible that this axle breakage is caused by a careless driver, who hits the curb-stone when making short turns, especially around right-hand corners. If the right-hand axle is the offender, this might prove a very likely cause.

We would also advise that you check the wheel bearings and if worn, adjust or replace these, as necessary. Also see that there is no appreciable difference in the tractive condition of the tires. If one tire continually slips on wet pavements, the other wheel and axle will be doing all the work; the brakes, too should be properly equalized.

These are only random suggestions. Should readers of this publication have other ideas on the subject, the Editor will be very glad indeed to pass them along.

GRAMM

—offers You Something New, as a Fleet Owner of Trucks, Trailers or Busses!

A Liberal Discount

— from the list prices of new truck, trailer and bus equipment (available in all types) is offered to those national fleet buyers who pay cash and service their own equipment.

The successful fleet operator handles his own service anyway — so we have eliminated this item from our fleet buyer costs.

The reliable fleet buyer can find enough of Uncle Sam's currency around his neck of the woods to pay cash for his equipment. When you buy on time you always pay a premium. For cash—well, you will be amazed at the prices Gramm will quote.

Low Service Parts Prices

Any fleet operator expects to buy parts — if you buy them from Gramm you will enjoy a discount that will reduce your upkeep cost amazingly. Send in a sample order for parts of any standardized truck or bus unit and give us a chance to prove this.

Redesigning and Remanufacturing

This is a service whereby Gramm takes your obsolete type truck, trailer or bus and after redesigning and remanufacturing turns back to you a fast modern unit ready for years of service—and—at a cost often less than half that of new equipment.

As exclusive truck, trailer and bus manufacturers for over thirty years the achievements of B. A. Gramm's engineering and producing organization have become the standards by which trucks, trailers and busses are judged.

Gramm motors have so much that is new and unusual to offer the fleet buyer—why not write them now and ask to be placed on their Fleet Buyers Discount List.

GRAMM MOTORS, INC.

EXPORT
WILLYS EXPORT CORPORATION
TOLEDO, OHIO, U. S. A.

Delphos, Ohio, U. S. A.

EXPORT
WILLYS-OVERLAND CROSSLEY, LTD.
STOCKPORT, ENGLAND

Powerful and fast—built to last!

READER SAY-SO

(Picked at Random from The Editor's Mail-Bag)

One Reader Helps Another

"AFTER reading the article on 'Backfires in the Muffler' in the December issue of THE FLEET OWNER, I have just one thought which might help.

"Abnormal back pressure in the muffler, *providing all other things are right*, will cause the backfire.

"Cars or trucks which often have backfiring in the muffler are cured by grinding the valves. However, this is usually only a temporary repair, due to the back pressure of the muffler, which in a very short period of time spoils the sealing of the valve and seat.

"Common causes of back pressure are:

1. Blocked or undersize mufflers.
2. Extensions on muffler tail pipe.
3. Small tail pipes on mufflers.
4. Added accessories attached to exhaust line, such as heaters.
5. Undersize hole in exhaust manifold muffler pipe gasket.

"Several cases of backfire have been cured by having the above corrected. I hope that these suggestions will assist in curing this case of trouble which one of your readers has had."—*B. H. Eaton, Motor Vehicle Supervisor, Bell Telephone Co., Pittsburgh, Pa.*

We Hope You'll Like It

"JUST a few lines to let you know that I get a lot of good valuable information out of your publication THE FLEET OWNER. I shall look forward to the receipt of your March issue, which is to be the first of the increased size and am sure it will be as good as the others."—*P. S. Vail, Supt., Langendorf United Bakeries, San Francisco, Calif.*

"Interesting and of Much Value"

"FOR several years you have been sending THE FLEET OWNER, your monthly publication, to J. C. Newell, in charge of our garage. We find this publication very interesting and of much value and should like to have the service continued; also any other literature that you may have of this nature."—*Washington Laundry, Spokane, Wash.*

"Entirely Satisfactory to Us"

"WE have thoroughly investigated the matter of THE FLEET OWNER and are pleased to inform you that the publication as it is at present time is entirely satisfactory to us."—*S. R. Ryno, Supt. of Delivery, L. Bamberger & Co., Newark, N. J.* (Editor's Note: *"One of America's Great Stores"*).

They Pass It Along, Too!

"YOUR publication, THE FLEET OWNER, is valued very highly by us. Upon receipt of this magazine it is carefully gone through by the writer, and then turned over to our head mechanic with certain articles called to his attention. The information taken from your magazine has a number of times proved very valuable.

"We do not feel confident to tell you how you can improve this magazine. Please accept our thanks for your services."—*L. L. Flint, Maintenance Superintendent, Iowa State Highway Commission, Cherokee, Iowa.*

He Says It's "Fine Work"

"I HAVE been greatly interested in the fine work you have been doing in the way of bringing before the 'owner-operators' the subject of oil reclaiming. Since we have been reclaiming crankcase oil over a period of several years, the subject is not altogether a new one for us. However, I would be most grateful to you for such literature as you may have available to send us."—*F. C. Fiechter, Mechanical Dept., John Wanamaker, Philadelphia, Pa.*

"A Gold Brick at Any Size"

"WE note that you are thinking of changing the size of THE FLEET OWNER and wish to advise, in answer to your inquiry, that we consider your book a gold brick at any size. Since the inside is so good, we do not believe it makes any difference what kind of outside you have on it."—*Curtis Bros. Transfer Co., Cleveland, Ohio.*

From Far-Away Alaska

"ENCLOSED find order for subscription to THE FLEET OWNER for one year. I am a mechanic in charge of the Havermor Consolidated Gold Fields' fleet of auto trucks and caterpillars, and appreciate the useful information found in your valuable monthly journal."—*Bud H. Harper, Nome, Alaska.*

Doctor Finds It of Value

"IN a recent issue of your publication there was an article on Monoxide Gas Poison, written by A. H. Vance. It proved of much value to me as I had a case recently of an auto mechanic who suffered with bronchial pneumonia as a sequel to monoxide gas poisoning."—*A. J. Hewett, M. D., Newburyport, Mass.*

Experience, the Best Teacher

"IN the January issue of THE FLEET OWNER you answer an inquiry from J. J. of Brooklyn, N. Y., in regards to installing new rings in an Austin. You state that the only way the pistons can be removed is to remove the cylinder block from the crankcase.

"This is not necessary. The baffles can be removed from the motor if a small bar is used to pry them out. They will, however, be ruined for further use, but they can be dispensed with.

"After the baffles are out, then remove the pistons in the usual manner. In the earlier models that had baffles in them, the pistons were not drilled for oil draining rings, but if ⅛-inch holes are drilled in the lower groove and a good type of oil-control ring installed, you will have a very satisfactory job. Then replace the pistons, from the bottom up, in the regular manner.

"We have an Austin in our fleet that had new rings installed in the aforesaid manner and from an oil burning condition at 7,000 miles, it has so improved that at 12,000 miles no oil needs to be added between 900-mile changes."—*Nelson D. Wagener, Thompson Ice Cream Company, Butler, Pa.*

From a Philippine Brewery

"WE are subscribers to THE FLEET OWNER and find it a very interesting and helpful publication. As a matter of fact we have followed many suggestions therein and have found them to our advantage and savings. We operate a fleet of 65 trucks and 10 touring cars."—*A. Monasterio, Transp. Supt., San Miguel Brewery, Manila, Philippine Islands.*

P. S.—He Got the Copies

"THE very constructive and comprehensive story of the Transcontinental Test Run of Southern California Freight Lines' unit which appeared in a recent issue of THE FLEET OWNER is greatly appreciated, and we should like to have you ship us a dozen copies of this number."—*Colonel J. D. Davis, Los Angeles, Calif.*

"It's a Real Book"

"I AM in charge of a fleet of 24 milk trucks and 4 passenger cars, consisting of Model A Fords and Chevrolets. I wish to thank you for THE FLEET OWNER which I receive every month. It is a *real* book."—*Henry Schwartz, Supt., Yoerg Milk Co., St. Paul, Minn.*

DIESEL TRUCK MAKES NEW RECORD

A NEW world automotive record has recently been established. Officials of the American Automobile Association have officially checked, registered and recorded at Washington the result of an unusual test run recently conducted on the Indianapolis Speedway.

In the test, a Diesel-motored truck, powered with fuel oil, made a longer non-stop run, without refueling, than has ever before been made anywhere by any type of vehicle. Then, after having been refueled, at more than 10,000 miles, it traveled farther without stopping than any other vehicle of any kind has ever been driven.

Because of the unusual nature of this truck test and because an official world record has been established, we believe that our readers will be interested in the story of the run, secured through the courtesy of the General Tire and Rubber Company, one of the sponsors of the test run.

The truck was of Indiana make, but powered with a Cummins Diesel Engine. It was driven by Dave Evans, race driver, and C. L. Cummins, president of the engine company which bears his name. Together they drove the truck, for two weeks without stopping, alternately driving and sleeping in a bunk improvised in the truck.

At the end of the run, A. A. A. officials found that the speedometer had registered 14,600 miles. The truck ran for 10,005 miles on its original fuel supply, the additional fuel being taken on without stopping. The run was voluntarily stopped by Mr. Cummins with the engine functioning normally, as the speed of the last lap was almost 50 m. p. h. No mechanical adjustments were made on the engine during the run. The best previous non-stop record was that of a small passenger car at 30.6 m. p. h., for 13,457 miles, according to Mr. Cummins.

Facts and Figures of the Run

Total Miles Traveled	14,600
Miles Without Refueling	10,005
Miles Without Truck Stopping	13,535
Miles Without Engine Stopping	14,600
Continuous Days and Nights of Operation	14
Average Weight—Truck and Load	16,750 lbs.
Average Speed Entire Distance	43.397 M. P. H.
Top Speed of Vehicle	65 M.P.H.
Total Gallons of Fuel Used	1,460
Average Fuel Cost Per Mile	49/100c
Ton Miles for 1c of Fuel	17.15
Total Lubricating Oil Consumed	8 Gal.
Miles Per Gal. of Lubricating Oil	1,825
Maximum Cooling Water Temp.	125°

No Fan was used. The Radiator was of 75 H. P. Gasoline Engine size.

The cooperation, products and services of the following companies contributed to the success of the run: Cummins Diesel Engine Co., Continental Oil Co., General Tire Co., Indiana Truck Corp., Gabriel Co., Philco-Transitone Radio Co., Vesta Battery Co., Noblitt-Sparks Industries, Bowes Sealfast Co.

Fleet operators who may be interested in the full details of the Cummins Diesel Engine, which is soon to be in production for trucks and busses, are invited to correspond directly with the Cummins Engine Company, Columbus, Ind. Literature and chart of dimensions can also be obtained from the Editor, if you prefer. No obligations of course.

TRAILER HAS "PLYMETL" PANELS

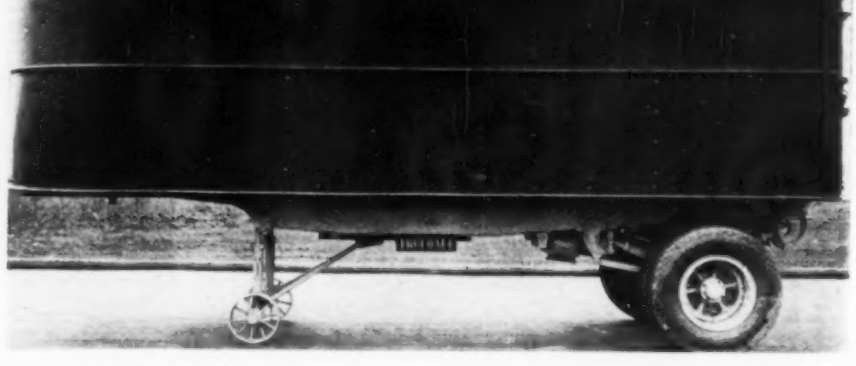
THE accompanying photograph shows the exterior view of a Fruehauf trailer which was exhibited at the recent Road Show held in Detroit. The following description tells the complete story of the weight reduction obtained by the use of Plymetl paneling. It will be noted that one-quarter inch "Eve" Plymetl was used. The following are the specifications and description:

Chassis Specifications

Gross Load	22,000 lbs.
Length Frame	18'-24"
Width Frame	40½"
Height Frame	47"
Chassis Weight	4,450 lbs.
Complete Weight	7,450 lbs.
Springs, 3½ x 52	12 lvs. 7/16"
	6 lvs. 3/8"
Axle	2¾ x 3½—3" Spindle
Frame	12" x 3½" x 11/32"
Tread	72¼"

Van Body Specifications

Length Overall	21'-6"
Width	96"
Height of Eaves	72"
Roof	Steel
Panels, ¼" Metal on both sides of 3-ply wood (Plymetl)	
Weight of Body	3,000 lbs.
Floor—Double—5/8" lower, ¾" upper	



with waterproof paper between.

This body is sufficiently strong for any reasonable purpose. The Plymetl paneling has a bending resistance and structural strength enough to carry any ordinary load, although on extra heavy work it will be well to panel the interior from the floor to a point above the belt.

The weight of 3,000 lbs. is approximately 1,500 lbs. lighter than the standard type of van construction.

The body is practically waterproof—the only exposed wood being the floor. The corrugations in the steel roof may be placed on the interior of a smooth exterior, if preferred. The heavy belt moulding, in addition to being a substantial rub rail, adds considerable strength to the side walls.

Readers interested in this type of body construction can get some interesting literature without obligation by writing to The Haskelite Manufacturing Corporation, 120 S. La Salle St., Chicago, Ill.

INTERNATIONAL'S NEW 1½-TONNER

ANNOUNCEMENT has just been made of the new International Harvester Model A-3, 6-cylinder, 1½-ton truck, the 136-inch wheelbase chassis of which is priced at $795 f.o.b. Springfield, Ohio. The Model A-3 is also available in 160-inch wheelbase at slightly higher cost.

The 6-cylinder engine which powers the new A-3 is of the detachable L-head type: 3¼-inch bore by 4½-inch stroke. Its piston displacement is 224 cubic inches. This engine develops a maximum brake horsepower of 54 at 2700 revolutions per minute. Its maximum torque is 138 pound-feet at 700 to 900 revolutions per minute. It is claimed to be unusually economical in fuel and oil consumption.

The clutch is of the single-plate type with built-in vibration damper, while the transmission provides four speeds forward and one in reverse.

The frame is of heavy pressed steel channels, 7 inches deep at the center and reinforced with numerous cross members which assure rigidity with ample flexibility to meet varying load and road conditions.

The front and rear springs are of the semi-elliptic type and semi-elliptic auxiliary rear springs are also provided.

The rear axle is of the full-floating, spiral-bevel-gear type with axle shafts of chrome-molybdenum steel. Pinion, differential, and wheel bearings are of the tapered roller type.

Four-wheel, mechanically operated, internal-expanding, shoe-type brakes and the cam-and-lever steering gear provide easy truck control at all speeds. Cast, spoke-type wheels with 30 x 5 front and 32 x 6 rear tires are standard equipment. Dual rear tires are also available.

In addition to the sturdy construction and economy of operation, the International Model A-3 presents an attractive appearance. Its lines are very similar to those of other International speed trucks. A wide variety of body types and sizes are available for this model.

Fleet owners interested in complete specifications and prices of this new 1½-ton model are invited to correspond directly with International Harvester Company, 606 S. Michigan Ave., Chicago, Ill., mentioning THE FLEET OWNER.

THE CHEVROLET TRUCKS FOR 1932

FEATURED by new prices, new chassis and new bodies, the most complete commercial line ever built by the Chevrolet Motor Company was introduced last month. Price reductions ranging as high as $65 on some models are included in the 1932 price list, which extends from $355 for the half-ton chassis to $1,020 for the 1½-ton van panel.

Twenty-seven standard production models, an increase of eight over last year, comprise the 1932 Chevrolet commercial line, which includes three wheelbases—109-inch light delivery, 131-inch truck, and 157-inch truck.

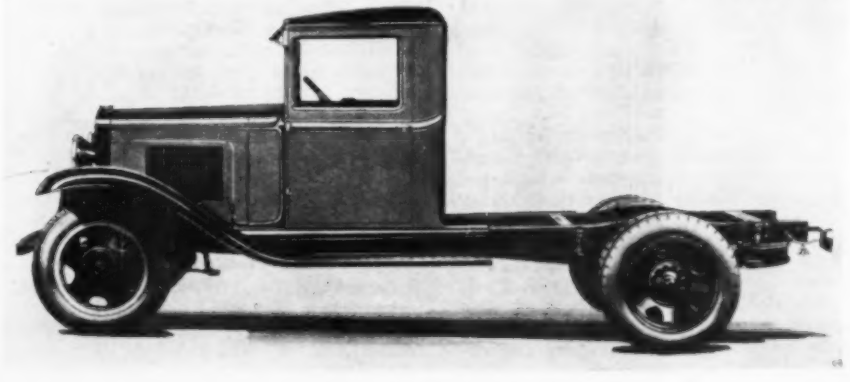
Among the many improvements engineered into the new commercial cars are a more rigid frame, stronger springs, stronger rear axle, more powerful engine, heavier clutch, new transmissions, improved universal joint, new wheels and tires, roomier, more comfortable cabs and lighter, more attractive bodies.

The light delivery is a half-ton vehicle built on a special frame with the fuel tank under the driver's seat. Axles, clutch, steering mechanism and wheels are passenger car units. The engine is the same as used in the heavier duty trucks. The transmission is the new syncro-mesh type, permitting silent gear shifting. The radiator shell, fenders and related parts have the same appearance as the truck line.

The 131-inch wheelbase truck (illustrated) is a 1½-ton vehicle. It is supplied with either single or dual wheel equipment. It has a frame six inches deep, four-speed transmission, ten-inch clutch, heavy duty front axle, new, heavier, more rugged rear axle, and a special truck engine. This truck has an allowable gross weight of 7,400 pounds when equipped with single wheels, and 8,200 pounds when dual wheels are supplied.

The 157-inch wheelbase truck, also a 1½-ton vehicle, has the same payload capacity as the shorter truck, uses the same major units except the frame, which is heavier and stronger, and is supplied with either single or dual wheel equipment. This truck is intended to carry bulky loads which require more body space.

646374 A



Wheels on both long and short wheelbase trucks are now made interchangeable in both single and dual wheel equipment. This desirable condition is made possible by the improvement in the design of the wheels and in the outer end of the rear axle.

Tread of the front wheels, the standard single rear wheels on the short wheelbase truck, and the inner wheels in the dual mounting is 56 inches. This insures tracking of the front wheels and two of the rear wheels. When 32 x 6—10-ply tires are used, the tread of the rear wheels is 57 inches. Due to the change in the wheel and axle design, the mean tread of the dual rear wheels is increased from 61 to 63½ inches.

With this improved arrangement, antiskid chains may be used on rear wheels without danger of interference. All of the truck wheels have raised centers with ten bolts for attachment to the hub. The raised center adds a great deal of strength and stiffness, while the interchangeability of the wheels permits conversion of a dual wheel arrangement to a single wheel set-up by simply removing the outer rear wheels.

For all front wheels and for dual rear wheels 30 x 5—6-ply tires are regularly supplied. For the single rear wheel set-up, 32 x 6—8-ply tires are furnished on short wheelbase trucks; 32 x 6—10-ply tires are furnished for single rear wheels on long wheelbase trucks and optionally on short wheelbase trucks. This size uses the 20 x 6 wheel, while others use the 20 x 5 wheel. To allow the same wheelhouse clearance, the tread of the 10-ply tire was moved out to 57 inches by the position of the 6-inch rim on the disc.

MOTOR "LORRIES" BY AUTOCAR CO.

AUTOCAR announces the production of two super-heavy-duty jobs, to which they have given the name "lorry." This is a well-known word already in use in England to designate vehicles quite the opposite of light delivery trucks. The lorries in this line are the four-wheel Model FE Autocar, with a gross rating of 30,000 lbs.; and the six-wheel model GE Autocar, gross-rated at 45,000 lbs. Those ratings may be adjusted to meet the maximum gross-weight laws of any state.

Unusual size, bulk and power have been incorporated in their design without giving them either the impression or the dimensions of "road hogs." Actual road width of their chassis is 7 feet 10½ inches, and the height to the top of their "Mogul" cab is about 8 feet 5 inches.

The lorries are powered by the Sterling Petrel engine, with 6 cylinders 5¼" x 6", which generates 156 h. p. at the governed speed of 1800 r.p.m. This is claimed to equal the largest piston displacement which is listed today for bulk-haul vehicle engines.

The Model FE lorry is designed to carry a body and payload of 8½ tons up a 5.2% grade in direct high gear, and to keep a sustained speed of 26 m.p.h. on level roads. Since low gear permits it to negotiate a grade of 66% there is ample reserve power for trailers.

The Model GE is planned to climb a 3% grade in direct high when body and payload is 14 tons. With this load its speed in direct high is 26½ m.p.h., with an over-gear high speed of 37.3.

Here Are the Details:

Engine—Sterling Petrel, 6 cylinder 780 cu. in. piston displacement; 156 horsepower at 1800 r.p.m. Torque 475 foot pounds at 1200 r.p.m. Mechanically governed to 1800 r.p.m.

Starter and **generator**—12 volts.

Transmission—selective sliding gear, unit-mounted, with 4 speeds forward, and one reverse.

Auxiliary Transmission—over-, direct-, and under-speed auxiliary transmission, mounted amidships.

Ratios—FE: 8.90 9.90 and 11.40
GE: 8.20 7.60 and 9.00

Rear Axle—FE: Timken Wisconsin 7872OW, double reduction, full-floating. GE: Timken SWD 410W tandem axle unit with inter-differential, worm type, full-floating.

Tires—FE: 10.50/24 balloons.
GE: 9.75/20 balloons.

Frame—Siderails 10½ x 3 x 5/16. Width 34½ inches. Reinforced by outside plate and liners.

Wheelbases—FE (four-wheel) 180, 216 and 234 inches. GE (six-wheel) 198, 216 and 234 inches.

Brakes—Westinghouse air brakes applied to all wheels. FE has 674 sq. in. of lining. GE has 720 sq. in.

Fuel Capacity—60 gallons. Auxiliary 60 gallon tank available.

Mogul Cab—Seats 4 men abreast. Spring cushion seat and back. Forced ventilation provided by stream-line casing in roof, fitted with motor driven fan. Cowl ventilation.

P. A. WILL NOW BUILD "TO ORDER"

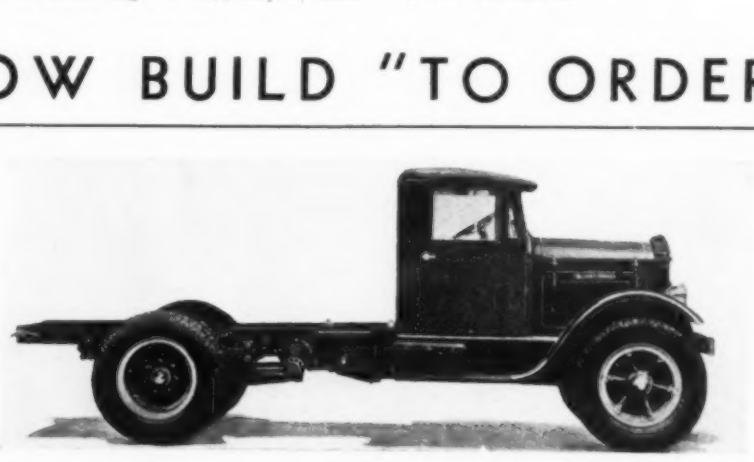
THE S. P. A. Truck Corporation this year pioneers in the field of medium and heavy duty haulage, with a rather revolutionary plan of truck manufacturing.

After many months of preparation, the Pierce-Arrow Division announces a system of progressive interchangeability in design which gives to fleet operators an unlimited range of truck models. Each truck delivered to a customer will be erected from specifications dictated by the hauling job to be done.

The new Pierce-Arrow program is founded upon a steady swing towards the production of trucks more specifically adapted to the exacting requirements of different industries, of different localities and of the many and varied state laws.

Pierce-Arrow believes that the ability not only to meet, but to anticipate definite trends of motor transportation, is to express the practical vision demanded by the truck buyer of 1932. The needs of modern highway transportation are complex. The basic principle of Pierce-Arrow's new program is the meeting of a complex situation by the simplest possible means; namely, that of a radically different engineering conception of what constitutes a truly suitable and adaptable line of truck models.

Pierce-Arrow has substituted in the place of a series of typical models, which for the most part in this industry have been nothing more than a series of individual designs, a system of major units, which, through a carefully developed basic design idea, can be assembled into any combination within reason to suit customers' requirements.



By the use of seven different engine capacities in combination with the proper axles and tires to suit the various load capacity ratings and with a carefully designed frame size to suit both the capacity and wheel-base, it has been possible to create 24 popular chassis combinations. This arrangement gives such closely spaced increments of gross ratings and such a high degree of interchangeability of major units as to fully cover the entire field from 12,000 lbs. maximum gross weight to 44,000 lbs. maximum gross weight.

The sale of a transportation unit most suitable to the buyer's requirements depends upon a clear and explicit understanding between buyer and seller of all the pertinent facts of the case.

The new Pierce-Arrow designs, developed through an inherently simple basic idea, permit the manufacture of trucks to meet all requirements at prices consistent with the economy of this new manufacturing plan and of the inherent quality of the product. The S. P. A. Truck Corporation, Buffalo, N. Y., will be glad to send full details to any fleet operator on request.

A NEW type of tire that operates with 12 pounds of air pressure is announced by General Tire & Rubber Co., Akron, Ohio. The tire is built with a triangular, instead of round cross-section. Its almost straight side-walls narrow from an unusually wide base, attached directly to an enlarged hub, to a tread no wider than is used on round balloons.

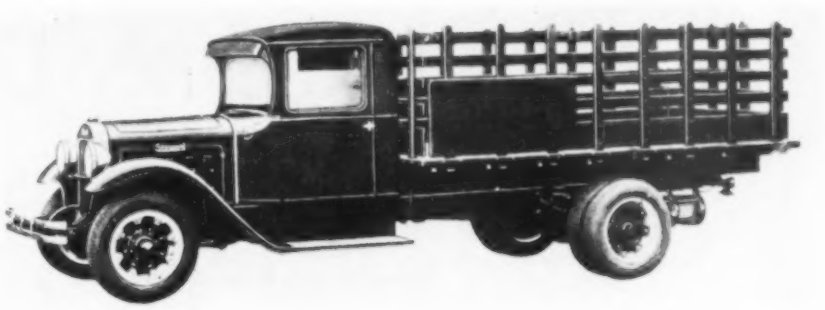
STEWART OFFERS NEW 2-TONNER

THE Stewart Motor Corporation of Buffalo, N. Y., recently announced a new two-ton chassis known as Model 50X having a weight of 4,015 lbs. and listing at $1195. Wheelbase is 145 inches standard and optional 134 inches. Larger wheelbases of 160 and 176 inches are optional at extra cost. Specifications are as follows:

The engine (6 cylinders) has a bore and stroke of 3⅜ x 4½ inches and a block horsepower rating of 65. Full pressure feed lubrication, removable block, removable cylinder head, bronze-backed main bearings and cast-in-rod connecting rod bearings are a few of the features.

Radiator is pressed steel shell type, chromium plated, cellular type core assembly with large top tank. Gas tank is located on side of frame. Capacity 20 gallons. Gasoline gage on dash. Carburetor is equipped with air cleaner. Down draft type. Ignition is battery type standard, magneto on special order. Delco-Remy engine driven distributor, generator and starter.

Clutch is single 11" dry plate type, equipped with vibration dampener, adjustable for wear. Transmission is unit-power-plant type, four speeds forward and one reverse, bolted direct to the bell housing on the engine. Shafts mounted on annular bearings. Gear ratios as follows:



Low, 6.40:1; second, 3.09:1; third, 1.69:1; fourth, 1:1; reverse, 7.82:1.

Steering gear is the Ross cam-and-lever type, roller mounted, with horn push button on top of steering post and three-spoke wheel 18" diameter.

Frame has pressed steel side rails, 7½" deep at point of greatest depth on all wheelbases. Thickness of metal, $\frac{7}{32}$".

Front axle is I-beam type, drop forged. Heavy knuckles. Hubs are equipped with Timken roller bearings. Tread 59", giving short turning radius.

Rear axle is the truck type with single piece, cast steel housing. Spiral bevel gear with straddled mounted pinion. Heavy differential mounted on Timken roller bearings. Axle shafts 1½" diameter, nickel steel, full floating type carried on Timken roller bearings. Standard gear ratio 6.37:1. Optional gear ratio 5.6:1. Tread for dual tires, 63¾".

Service brakes, four wheel, Bendix Duo-Servo, front, 14" x 2"; rear, 16" x 2", mechanically operated by the foot pedal. Hand brake contracting type, mounted on transmission. Size 2½" wide by 8" diameter.

Wheels are steel spoke type equipped with demountable rims. Six spokes in wheel.

Tires, standard equipment, are 6.50-20 balloons, duals on rear. Single tires extra cost. 7.00-20 balloons at extra cost.

"ARMORPLY" FOR PANEL BODIES

AN educational campaign has recently been inaugurated by United States Plywood Company of New York, the purpose of which is to inform motor fleet operators of the merits of its product, "Armorply", a body panel material.

Armorply is a metal-faced plywood, to which are cemented thin sheets of Armco "Paintgrip" steel. A patented elastic glue binder is used to hold the ¼ or ⅜-inch plywood to the steel, and the metal sheets are specially processed to take and hold paint, the makers point out.

Extensive laboratory and field research work led to the development of this elastic binder, which is said to fully compensate for the difference in coefficient of expansion and contraction between metal and wood. Alternate freezing and heating tests were conducted over a period of months to prove the durability of this binder, according to the Company. Further tests to determine the solubility of the glue, as well as its immunity to acids have also proved its ability to withstand practically any condition encountered in service.

The Armorply glue developments have been the result of the experience of Lawrence Ottinger, president of the U. S. Plywood Company, and for many years an authority on adhesives. The development of Armorply itself has been under the supervision of James J. Dunne, for many years engaged in production and sales departments in this particular field.

Some of the important fleets in which Armorply panels are being used include the Vacuum Oil Co. (illustrated), Atlantic and Pacific Tea Co., Borden Farm Products Co. and Metropolitan Distributors, Inc., and John J. Casale, Inc., of New York.

By reason of maintaining warehouses in principal cities, the manufacturers have been able to market Armorply at low cost. Warehouses are located in New York, Boston, Philadelphia, Rochester, Washington, D. C., and Los Angeles. Dealers have been appointed in New York, Newark, Pittsburgh, Milwaukee, Montreal and Toronto. Establishment of the company's own warehouse stocks in 14 more cities is contemplated during 1932. For complete details of this body-building material, readers are invited to write directly to U. S. Plywood Company, 603 W. 36th St., New York City.

for ROAD *and* SHOP

Rajah Terminal Tool

SOMETHING new in a hand tool to permanently attach terminals to ignition cable without solder, is offered by The Rajah Company, Bloomfield, N. J., makers of the well-known "Rajah" spark plugs, terminals and other products.

But three simple operations are necessary—the cutter on the end of the tool removes sufficient insulation and the exposed wire strand is then bent over. The terminal is next applied and a slight squeeze on the handle crimps it permanently in place.

The Rajah terminal tool is sold with a box of assorted terminals and this outfit, together with a roll of good ignition cable enables the fleet repairman to immediately "manufacture" a set of new cables for any engine, without the necessity of a large stock.

The terminal tool is also sold separately, at a nominal price. For further details write to The Rajah Company, Bloomfield, N. J., mentioning this publication.

"Sponge-Aire" Truck-Bus Seat

A SOFT, resilient, sponge rubber seat for truck and bus drivers is announced by the Sponge-Aire Seat Company, Buffalo, N. Y. This new seat surpasses the ordinary coil spring seat in comfort, it is said, and has the added advantages of lasting from ten to twelve times as long and costing practically the same. By eliminating the serious vibrations of road-shock, Sponge-Aire minimizes the health-impairing effect of truck or bus operation.

The resiliency of sponge rubber is, of course, known to every one. In the new Sponge-Aire seat the varying resiliences of different densities of sponge rubber are taken advantage of. A Sponge-Aire seat is usually built up of several layers depending, in number, upon the particular needs of the driver. In all designs, however, the more porous layer is next to the body, forming a restful cushion for the body contour. This layer, because of its porous nature, is said to "breathe", thereby affording comfortable ventilation.

The denser layers are towards the base of the seat to absorb the heavier road-shock and chassis vibration. These basic layers also prevent the catapulting action and side sway of ordinary spring cushions.

Due to the close relationship between a driver's comfort and his alertness, Sponge-Aire offers to the truck and bus owner a proven method of reducing road accidents and costly damage. It is now being successfully used by fleets of divisions of Borden, Standard Oil, Shell, Texaco, General Ice Cream, National Biscuit, etc., according to the makers, who will send full details and prices on request.

Valve Insides Stocked Easily

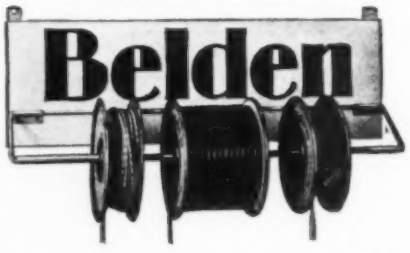
THE Dill Manufacturing Co., Cleveland, Ohio, makers of tire valve parts and accessories, announces a product that is different from anything else on the market. It is the "Dill Jiffy Server" for valve insides. This new machine will be of unusual interest and importance to fleet maintenance men.

The "Dill Jiffy Server" dispenses Dill No. 100 AA Super-Seal Valve Insides, by clipping them off, one at a time as they are needed, from "cartridge rolls." A roll of 100 valve insides fits the machine.

Dispensing valve insides with the new machine is handy, quick and economical. Because valve insides can be clipped off just when needed, waste of stock is prevented. And because each valve inside is hermetically sealed in an individual "cartridge," stock is protected from dirt and grease and always kept fresh and clean.

The new "Dill Jiffy Server" has already won wide acceptance among rubber companies, garages, tire repair shops and the fleet trade. Complete information, including prices, can be obtained from the Dill Mfg. Co., Cleveland, Ohio, or the Editor.

Midget Wire Assortment



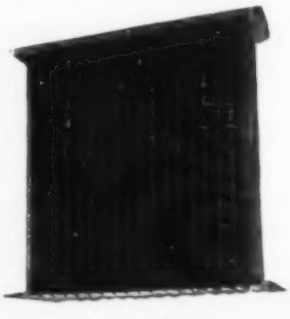
A NEW Midget Wire Display Rack and Assortment is announced by the Belden Manufacturing Company, 4689 W. Van Buren Street, Chicago. This is a companion to the Belden Midget Battery Cable Display announced some time ago. The wire assortment includes spools of Beldenlac Aircraft Standard Ignition Cable and Nos. 16 and 14 Primary Wire. It is estimated that the assortment will service approximately 90% of all rewire jobs.

The rack, size 22x7, attractively lithographed in orange and black, is furnished free with the assortment. It is both a display and a handy stock rack.

Replacement Radiator Cores

OVAL tube tubular type cores of the Kramer brand, manufactured by the Trenton Auto Radiator Works, Trenton, N. J., are available to fleet owners for recore service both in the bolt-on type and solder-in type radiators.

Kramer cores are furnished with guarantee of cooling parity equivalent to standard equipment and burst-proof, due to freezing, because of their oval tube expansion construction.



Literature is available upon request. Write to the maker, as above, or to the Editor.

NEW STUFF *for* ROAD *and* SHOP (*Continued*)

Automatic Extension Winder

ONE of the newest products of the Packard Electric Company, Warren, Ohio, is their automatic extension cord winder, illustrated here.

Some of its features, as pointed out by the makers are: direct electrical connection—no rotary wipe contact; winding arm revolves, picking cord off the stationary drum in unwinding and laying it back on drum in rewinding by spring action; smooth and frictionless in operation; ball bearing main shaft; ratchet locks arm for any desired length of cable; lacquer finish.

The winder is equipped with 40 feet of Packard cable and the hand-lamp is of all-rubber type, with reflector, guard and hook. Write to the maker, or the Editor for full details and price.

"Centrifuse" Brake Drums

ONE of the new developments for 1932 is the novel brake drum introduced by Motor Wheel Corporation, Lansing, Mich., for which a number of advantages are claimed—among them five-times' longer service.

The new drum is called the "Centrifuse", derived from the centrifugal fusion operation forming the basis of the process by which it is produced. It is a composite drum incorporating three parts—a steel foundation ring; an iron braking ring, fusion-bonded to the steel ring; and the back.

This construction, according to the makers, gives the "Centrifuse" the structural strength of steel, a lightness comparing favorably to that of the pressed-steel drum, and the recognized advantages which cast-iron affords as a brake drum material.

An interesting booklet describes the new drums in full detail. It will be sent free on request to the Editor; or you may write directly to Motor Wheel Corporation, Lansing, Mich., asking for the "Centrifuse booklet."

Armorply Price List and Products

THE new Armorply price list now being distributed by United States Plywood Company announces still further reductions in price due to transfer of manufacturing operations to its new plant in Youngstown, Ohio.

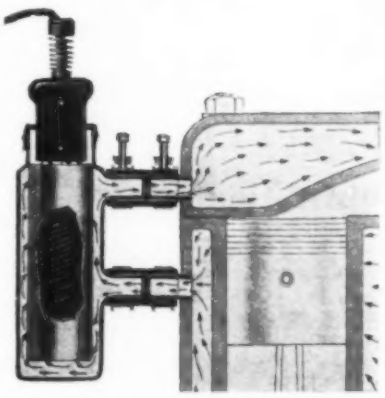
In addition to the standard white pine plywood back Armorply is now manufactured with poplar (white wood) backs.

Two important new products are Armorply with a Balsa or Celotex core. These new constructions will, it is believed, meet a growing demand for insulating panels.

All Armorply panels are faced with Armco Paintgrip Steel, a heavily galvanized sheet with an exceptional painting surface.

An unusually strong and elastic bond between the wood and metal of Armorply is obtained by a special patented adhesive used, under patent license agreements, by United States Plywood Co., 603 W. 36th St., New York City. Price list and literature will be sent promptly on request.

Cadet Motor Heater



THIS is an electrically-operated (light-socket) immersion heater for the pre-heating, warming-up, or keeping warm of automobile, bus or truck engines while parked in cold garages or on lots. It heats the water in the engine when plugged into a light-socket.

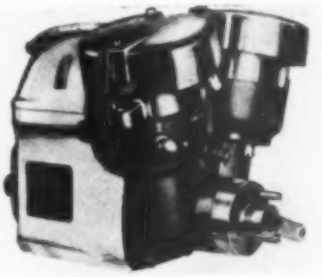
It is permanently attached to the engine water jacket, as shown in the illustration, and will heat a large motor in 30 to 45 minutes, consuming less than one kilowatt-hour of current, according to the makers. Three different degrees of heat are provided, so that continuous, all-night warming can be obtained, or it can be used as a pre-warming device before starting out on a cold morning.

Two connections are made to the water jacket, as shown, and the electrical connection, via plug, is made to a light-socket or other outlet. The use of this heater provides quick starting with a minimum of crankcase dilution; also does away with the racing of cold motors and the lack of lubrication due to congealed oil.

Can be installed on all makes of cars, trucks and busses. Plug pulls out when not in use and it can be left attached permanently. Made by West Bend Aluminum Company, West Bend, Wis., who will be glad to send circular and prices on request.

"Rapid Transit" Magnetos

ANNOUNCED recently by United American Bosch Corporation, Springfield, Mass., is the new ignition system, designated as "Rapid Transit Ignition Magnetos." These are especially designed for use on busses, trucks and other gasoline-powered units in heavy-duty fast service.



The new product includes three types of six-cylinder magnetos: the JR-6 which is for use on engines with a single ignition system; the JRD-6 which is equipped with dual ignition operating on one set of spark plugs; and the JRZ-6 (illustrated) for use on engines with both battery and magneto ignition, having two spark plugs per cylinder operating simultaneously.

Among the features of these new magnetos are: high tension distribution by means of a timer type distributor mounted on the rear end of the magneto; stationary interrupter which is operated at one-half engine speed or one-third the speed of conventional types; consequent less wear. Stationary winding of unusually large size delivers a spark of great intensity.

On the JRD type there is a spare interrupter for use with battery ignition in case trouble develops at any time. By simply inserting one high tension lead and turning a control knob, the source of power is transferred to battery ignition, and the vehicle can proceed immediately. The spare interrupter is inoperative when the other is in service and vice versa. They are operated by individual cams.

Many other interesting features are outlined by the maker, who will be glad to send literature free on request. The Editor will get it for you, if you prefer.

Split Lock Replacer

HERE'S welcome news to every fleet mechanic! The Sunnen Products Company, of St. Louis, announce that they have just placed on the market a new split lock replacer that will replace any size or shape of split valve lock automatically.

The outstanding feature of this new tool is the fact that locks will not jump out, even if hit against the valve stem. Because of its narrow sides and compact design, the Sunnen Split Lock Replacer works easily in smallest spaces and gets in at any angle.

The jaws of this tool open automatically when pushed against valve stem. The list price of the Sunnen Split Lock Replacer is $2.00. Write to the maker for full details.

Money in Every Page

SERVICE MAN'S GUIDE — TO Automotive Lubrication

NOW comes a marvel book that with 132 pages and 117 illustrations comprehends all the practical, useful knowledge of automotive lubrication the finest university course could teach you.

Written by two of the country's foremost automotive authorities—Mr. John R. Rathbun, M.E., technical editor of Petroleum Age and author of Petroleum Age Handbook—assisted by J. Howard Pile, former technical editor of Motor World and Automobile Trade Journal, and now editor of CHEK-CHART, the Automotive Lubrication Encyclopedia.

Condensed, concentrated, boiled-down — it teaches so simply and clearly why certain lubricants are required by certain mechanisms, that you can quickly take rank as a lubrication expert.

It's so easy, too. One thorough reading gives you ideas and information worth a dozen times its cost. And 2 or 3 hours' study a week will soon put you in the way of bigger money and the bigger job.

$2.00—NOW—will be the best investment you ever made—

For this condensed university course in practical lubrication —132 pages—117 illustrations

ONLY $2.00

ORDER TODAY

Book Department

The Ferguson Publishing Co.

90 West St., New York City

Our Advertisers:

Ahlberg Bearing Co.	—
Belden Mfg. Co.	3rd Cover
Boyle Valve Co.	39
Bragg-Kliesrath Corp.	6
Dill Mfg. Co.	11
Ethyl Gasoline Corp.	4 & 5
Firestone Tire & Rubber Co.	3
Fort Shelby Hotel	43
Goodrich Co., B. F.	22 & 23
Gramm Motors, Inc	46
Hall Mfg. Co.	Front Cover
Haskelite Mfg. Corp.	17
Highway Trailer Co.	27-28-29-30
International Harvester Co.	2nd Cover
Little Giant Products, Inc.	41
N. Y. Mica & Mfg. Co.	41
Rajah Co.	37
Reo Motor Car Co.	8
S.K.F. Industries, Inc.	—
Skinner Motors, Inc.	33
Sponge-Aire Seat Co.	19
S. P. A. Truck Corp.	25
Thermoid Rubber Co.	14 & 15
Timken-Detroit Axle Co.	21
Toledo Steel Products Co.	13
United States Plywood Co.	4th Cover
Vellumoid Co.	37
Welch Pac-Less Pump Co.	39
Whirlgas Sales Co.	35

Tell Them You Saw It in

"FLEET OWNER"

They'll Appreciate It!